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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during June, 1966



Scientific and Technical Information Division

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WASHINGTON, D.C. JULY 1966

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INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

- a. NASA entries identified by their *STAR* accession numbers (N66-10000 series),
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- c. LC entries identified by a number in the A66-80000 series.

Many of the abstracts included in this publication have been reproduced from those appearing in *STAR* and *IAA*. This procedure, adopted in the interests of economy and speed, has introduced some variation in size, style, and intensity of type.

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(continued)

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LC Entries

Articles listed are available in the journals in which they appeared. They may be borrowed or consulted in libraries maintaining sets of these journals. In some instances, reprints may be available from the journal offices.

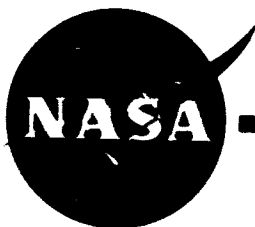
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Other organizations can purchase copies of the bibliography from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

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AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography

JULY 1966

STAR ENTRIES

N66-21110# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.
EFFECTS OF VISUAL FIXATION AND UNCERTAINTY ON CONTROL PANEL LAYOUT Final Report, May 1963-Dec. 1964

Donald A. Topmiller and Earl D. Sharp Oct. 1965 37 p refs (AMRL-TR-65-149; AD-627702) CFSTI: HC \$2.00/MF \$0.50

Seated subjects reached to and operated 12 toggle switch controls located 31, 41, and 51 inches above the floor and 0, 25, 50, and 75 degrees to the left of the mid-sagittal plane. The effects on the reaction time, reach time, and total response time of three-variables—control location, visual fixation/uncertainty, and anthropometric size of subjects—were investigated. Analyses of variance indicate that control location and visual fixation/uncertainty affect reaction, reach, and total response time; but body size does not. Derived scores were also analyzed to permit detailed examination of the perceptual-motor components of the response scores. The linear relationships between reach rate and reach distance observed in this study are compared with the curvilinear relationships reported in micromotion literature. To aid in evaluating control arrangements, response-time isograms are presented.

Author (TAB)

N66-21119# North American Aviation, Inc., Columbus, Ohio
EFFECTS OF DISPLAY QUICKENING ON HUMAN TRANSFER FUNCTIONS DURING A DUAL-AXIS COMPENSATORY TRACKING TASK Final Report, May 1963-Jun. 1964

Angelo P. Verdi, George N. Ornstein, Richard P. Heydom, and George Frost (AMRL) Wright-Patterson AFB, Ohio, AMRL, Nov. 1965 220 p refs

(Contract AF 33(657)-11102)

(AMRL-TR-65-174; AD-627671) CFSTI: HC \$6.00/MF \$1.25

The research was concerned with the human's behavior in adapting his response mode to variations of certain conditions of a compensatory tracking task. The task conditions evaluated were quickening level, system gain, task load, and task complexity. The results of the studies show good agreement with the transfer function 'adjustment rules' developed by other investigators. When quickening is introduced, the human adjusts his transfer function in a systematic and predictable manner in response to variations of the quickening

level. As the amount of quickening increases the operator increases gain and lag but decreases lead. The human adjusts his equalizing parameters to achieve stable loop performance for all quickening levels. Man's ability to reduce the system error is significantly affected by the distribution of gains in the overall man-machine system. The human's transfer function for single and dual task load conditions probably differs. Tracking error was found to be least when the quickening level used in the second axis is identical to that in the axis of primary interest; error increased as the quickening levels for the two axes became more dissimilar.

Author

N66-21132# Normalair, Ltd., Yeovil (England).
THE DESIGN OF A PERSONAL PORTABLE CONDITIONING SET FOR MOON BASED OPERATIONS

P. W. Fitt and B. Corrigan [1965] 21 p

CFSTI: HC \$1.00/MF \$0.50

Human engineering was approached from the direction of providing moon explorers with pressure suits which afford comfortable environments. The study covered pressurization, heat dissipation, personal cooling, and ventilation and breathing. It was decided that the pressure suits be provided with totally self contained conditioning equipment independent of any umbilical attachments. A description was given of the conditioning circuit believed to be capable of meeting the full requirements for moon based operations. This set would have a total weight of about 58 lb. in earth units and its weight would be located close to the user's back to avoid excessive inertial effects when turning.

C.L.W.

N66-21168# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.

CINERADIOGRAPHIC OBSERVATIONS OF HUMAN SUBJECTS DURING TRANSVERSE ACCELERATIONS OF +5G_x AND +10G_x

Harold Sandler 21 Oct. 1965 17 p refs

(NADC-MR-6501; AD-625254) CFSTI: HC \$1.00/MF \$0.50

X-ray motion pictures were recorded for five human subjects during transverse accelerations of +5G_x and +10G_x on the Johnsville centrifuge. Quantitative measurements of change in A-P chest diameter and heart position were made from photographic prints of the films. A slight but significant posterior displacement of heart position could be demonstrated when compared to change in the A-P chest diameter.

Author (TAB)

N66-21184# Joint Publications Research Service, Washington, D. C.

COORDINATION OF HUMAN VOLUNTARY MOVEMENTS DURING FLIGHT IN OUTER SPACE

Levan Vladimirovich Chkhaidze 22 Mar. 1966 140 p refs Transl. into ENGLISH of the book "Kordinatsiya Proizvol'nykh Dvizheniy Cheloveka V Usloviyakh Kosmicheskogo Poleta" Moscow, "Nauka", 1965 p 1-111 (JPRS-34654; TT-66-31093) CFSTI: \$4.00

The problem of man's motor coordination in a modified gravity field, as a consequence of spatial exploration, is discussed. In approaching the problem, the most important material on the general principles of voluntary movement coordination of human beings and animals on the whole was systematized. This material is given as the basic biophysical mechanisms involved, and tasks confronting the central nervous system during the regulation of voluntary movements. An increase in the gravitational field was simulated by inertial forces appearing during accelerations. It was found that an increase in the gravitational field not only led to disturbance of the assigned motor coordination, but also influenced the dynamic component of motion which was the basis of the manual pressure tests studied. However, due to the properties of the central nervous system, reinforced by training, coordination of voluntary movements will return to the familiar norm. Under conditions of decreased and zero gravity in parabolic aircraft flight and in orbital flight, it was determined that serious disorders of coordination of voluntary movements should not be expected after sufficient training and that stable performance quickly replaces any initial motor impairment. E.A.O.

N66-21194# Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.

METHODOLOGICAL PROBLEMS OF THE PSYCHOPHYSICAL METHODS OF LIMITS AND CONSTANT STIMULI Robert M Herrick 30 Jun 1965 41 p refs (NADC-ML-6505; AD-624452) CFSTI: HC \$2.00/MF \$0.50

The method of limits (ML) and the method of constant stimuli (MCS) can be related on the basis of simple probability considerations. From the probability relationship many deductions may be made. Examples of such deductions indicate, among other things, (a) the characteristics of distributions of thresholds in the ML, (b) the influence of the number of stimulus steps, the number of 'Yes' responses required at a step, the number of threshold determinations, etc., (c) preferred methods for comparisons within the ML and between the ML and the MCS, (d) incompatibility of present-day assumptions concerning the ML and the MCS.

Author (TAB)

N66-21205# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

SIMPLIFIED METHOD FOR LABELLING LIPIDS WITH IODINE-131 [METODO SIMPLIFICADO PARA LA MARCACION DE LIPIDOS CON YODO-131]

Aldo E. Mitta and Marcelo A. Dankert 1965 10 p refs in SPANISH (CNEA-182) CFSTI: HC \$1.00/MF \$0.50

A simple procedure is described for labelling triolein, oleic acid, and other lipids with iodine 131. The method combines several previously known techniques resulting in radioactive yields on the order of 90 to 95%. Previous techniques are discussed and the experimental procedures and controls used for the new method are described in detail.

Author (TAB)

N66-21216# Joint Publications Research Service, Washington, D. C.

SPACE PENETRATION AND MAN'S IMPRESSION OF OUTER SPACE

A. A. Leonov and V. I. Lebedev 18 Mar. 1966 15 p Transl. into ENGLISH from Vopr. Filosofii (Moscow), no. 1, 1966 p 3-11

(JPRS-34615; TT-66-31054) CFSTI: \$1.00

Presented is the translation of an article by Soviet cosmonaut A. A. Leonov and candidate of Medical Sciences V. I. Lebedev. In this article the authors touch upon many problems encountered in perceiving spatial relationships by a man during cosmic flight. The article was written for the purpose of drawing the attention of philosophers and psychologists to these problems. M.R.W.

N66-21217# Joint Publications Research Service, Washington, D. C.

A HUMAN EMBARKED INTO OUTER SPACE

N. M. Sisakyan et al 15 Mar. 1966 28 p Transl. into ENGLISH from Chelovek Vyshe V Kosmich. Prostranstvo (Moscow), 1966 p 3-10

(JPRS-34576; TT-66-31016) CFSTI: \$2.00

Brief discussions on Soviet scientific and technical achievements in the field of space research are presented. The following topics are considered: first attempts at the entry of man into free space (i.e., "walk-in-space"); training of the astronauts; problems of space psychophysiology; the success, accomplishments, and descriptions of Russian space flights, elaborated by astronauts Belyaev and Aleksey. M.R.W.

N66-21219# United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.

FILM DOSIMETRY PRACTICE WITH THE A.E.R.E./R.P.S. FILM HOLDER: A COLLECTION OF EXPERIMENTAL DATA N. Adams, M. J. Heard, and P. D. Holt 1965 90 p refs (AERE-R-4669) HMSO: 12s

Because various laboratories of the U.K. Atomic Energy Authority and the Radiological Protection Service had adopted the same film dosimeter for personnel monitoring (viz. Kodak R.M. film contained in the AERE/RPS plastics holder) it was desirable to establish agreed film dosimetry procedures. These procedures are supported by experimental measurements, made over several years by various workers and now collected together in this report for the benefit of users of this film dosimeter and of other dosimetry workers. The experimental programmes included investigations of the following: (1) response of the film dosimeter to photon and beta radiation; (2) photographic processing, dose-density relation, developer performance; (3) calibration, design of calibration jig, choice and use of radioactive source and calibration films; and (4) dose assessment, comparison of AERE and RPS systems.

Author

N66-21240*# Massachusetts Inst. of Tech., Cambridge. Engineering Projects Lab.

ANALYSIS OF PREDICTOR MODEL

J. Kreifeldt 6 Jul. 1964 41 p

(Grant NsG-107)

(NASL-CR-62006; M-9991-2) CFSTI: HC \$2.00/MF \$0.50 CSCL 05H

In this outline a model of a human operator controlling a vehicle was analyzed. The model attempts to account for the fact that in many situations (i.e., driving) the operator has an input which is not a single point in time but an input which has spatial as well as time features. That is, he can look at the road ahead. The sampling theorem in spatial coordinates was invoked in order to treat the time-space input as k discrete inputs to the operator simultaneously available. The model then states that the operator runs some sort of thought experiment in which he extrapolates his position

and computes future error if he maintains the same control signal. This computed and weighted predicted error forms the basis for his control action. His thought experiment requires π seconds and during this time the control signal remains constant. The model performs the thought experiment by computing from vehicle initial conditions and command signal, what the errors will be at the previewed points. These individual errors are simultaneously computed and weighted in a length of time requiring π seconds. The transformed impulse response for this model was derived and seen to be composed of discrete and continuous elements. This impulse response was specifically evaluated for a first-order vehicle and two input points. It was seen that if stable, it eventually reaches a reference step height input. Author

N66-21247# Joint Publications Research Service, Washington, D. C.

RECENT OXYGEN STUDIES IN HUMANS AND ANIMALS
A. A. Shurubura et al 24 Mar. 1966 33 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 51, no. 12, Dec. 1965 p 1474-1477; 1501-1506
(JPRS-34698; TT-66-31137) CFSTI: \$1.00

Adaptation to hypoxia in adult male white rats was accomplished over a month's period. These rates and control rats were tested for frequency and nature of respiration, general motor activity, muscle tonus, and spasmodic twitching of separate muscles or the entire body. The blood content of the skull was examined by electroplethysmography for changes from gravitational stress. It was concluded that adaptation to hypoxia increased their resistance to gravitational stress. In a second experiment, white mice were allowed to travel at will through a gas chamber with various gas steps, or mixtures. Humans were permitted to choose various gas mixtures flowing to their respiratory masks. The gas choices were normoxic and hypoxic mixtures of nitrogen-oxygen and helium-oxygen. Both mice and humans were found to prefer helium-oxygen mixtures to nitrogen-oxygen and normoxic to hypoxic mixtures. It was concluded that the helium, due to its low density, increases pulmonary ventilation without increasing the work of the respiratory muscles. N.E.N.

N66-21250# Production Group, United Kingdom Atomic Energy Authority, Annon (Scotland). Production Group
THE BIOLOGY OF THE SOLWAY FIRTH IN RELATION TO THE MOVEMENT AND ACCUMULATION OF RADIO-ACTIVE MATERIAL. III: FISHERIES AND FOOD CHAINS
B. R. H. Williams, E. J. Perkins, and A. Hinde 1965 93 p refs

(PG-611(CC)) HMSO: 14s

The Solway fisheries are described and reasons suggested for recent declines. An account is given of the bottom fauna and food of fish with special reference to the food and biology of flounders and plaice. Primary sources of nutrition are discussed. A marked interspecific competition for food occurred and it is concluded that no one food chain is limiting. Author

N66-21253# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

SOME CONSIDERATIONS ON THE PROPERTIES OF THE LIVING SYSTEMS [ALCUNE CONSIDERAZIONI SULLE PROPRIETA DEI SISTEMI VIVENTI]

M. Ageno 18 Jun. 1965 34 p refs
(ISS-65/20) CFSTI: HC \$2.00/MF \$0.50

The present paper summarizes the author's opinion concerning the problem of the possible use of quantum mechanics in describing a living system. The first remark is that a system containing a living being cannot be in a single quantum mechanically defined state. This raises the question if special laws independent of the laws of physics and chemistry are required to describe life: the discussion ends with the conclusion that for the moment we can only try to expand our present system of physical concepts in order to obtain a description of the phenomena of life. Secondly, the limits that we encounter here in the use of conventional chemical concepts are put into evidence as well as the leading role of quantum mechanics. From this point of view, the cell reproduction and how this differs from the process considered by von Neumann are examined. Actual reproduction of a cell is tentatively described as an interference phenomenon occurring in a superposition of states and the importance and meaning of the concept of structure are discussed. Author

N66-21263# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

PAPERS PRESENTED BY THE PHYSICS LABORATORY AT THE 2nd NATIONAL MEETING ON BIOPHYSICS DEVOTED TO BIOLOGY AND MOLECULAR BIOPHYSICS, ROME, 18-20 JUNE, 1965, PART II [COMUNICAZIONI PRESENTATE DAI LABORATORI DI FISICA AL 2nd CONVEGNO NAZIONALE DI BIOFISICA DEDICATO ALLA BIOLOGIA E BIOFISICA MOLECOLARE, ROMA, 18-20 GIUGNO 1965, PARTE II]

20 Jun. 1965 42 p refs In ITALIAN; ENGLISH summary
(ISS-65/22) CFSTI: HC \$2.00/MF \$0.50

Reports include: (1) some studies on the phenotypic suppression of ambivalent phage mutations by streptomycin, and on the main features of this phenomenon; (2) the analysis of the properties of labelled RNA, extracted from spinal ganglia of chick embryos, and the study of the action of the NGF growth factor; and (3) physio chemical studies on the dissociation and structure of Eriphia hemocyanin as observed by means of light scattering, analytical ultracentrifugation and electron microscopy studies. Author

N66-21270# School of Aerospace Medicine, Brooks AFB, Tex.

AN ATLAS OF CROSS-SECTIONAL ANATOMY OF THE MACACA MULATTA FOR USE IN RADIOBIOLOGIC EXPERIMENTS

Glenn V. Dalrymple, John J. Ghidoni, Harold L. Kundel, Ian R. Lindsay, and Melvan D. Jordan May 1965 31 p
(SAM-TR-65-32; AD-469874)

To properly perform radiobiologic experiments, a knowledge of the anatomy of the irradiated subject is of greatest importance. Since an atlas of anatomy of the Macaca mulatta is not available and since this animal is very frequently used in radiobiology, this atlas was prepared to implement such experimentation. A 3-kg. female primate cadaver was transversely cut into 25 sections and from these sections color plates were prepared. The atlas can be used to demonstrate depth dose distributions following irradiation. Author (TAB)

N66-21274# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

THE EFFECT OF X-IRRADIATION ON THE DIVISION CYCLE OF CELLS IN TISSUE CULTURE [DE INVLOED VAN RONTGENSTRALING OP DE DELINGSCYCLUS VAN IN VITRO GEKWEKTE CELLEN]

D. Bootsma Apr. 1965 98 p refs In DUTCH; ENGLISH Summary
(MBL/1965/9) CFSTI: HC \$3.00/MF \$0.75

The first post irradiation generation cycle of human cells in a monolayer asynchronous tissue culture was studied. By labelling cells with ^3H -thymidine minutes it was demonstrated that the generation cycle could be divided into four phases based upon the synthesis of DNA. If a pulse labelling with ^{14}C -thymidine were followed by labelling with ^3H -thymidine until fixation, mitoses of cells before, during, and after DNA synthesis could be identified. The influence of irradiation on the entrance of cells into mitosis was studied in synchronous cultures by irradiation at different intervals of time after a second treatment with 7.5 mM thymidine. It was found that mitotic delay is caused by an inhibition of progression in the phase following DNA synthesis. Cells irradiated during this phase were blocked for long periods of time. Cells which were irradiated before and during DNA synthesis were blocked for lesser periods of time. These differences in degree of mitotic delay were found to bring about partial asynchronization leading to overshoot of the mitotic index. D.T.

N66-21275# European Atomic Energy Community, Brussels (Belgium). Biology Dept.

EFFECT OF RADIATIONS ON THE DETOXICATION OF α -METHYLNAPHTHALENE [EFFETTO DELLE RADIAZIONI SULLA DETOSSICAZIONE DELL' α -METILNAFTALENE]

P. Scoppa and K. Gerbaulet 1966 16 p refs In ITALIAN; ENGLISH summary Presented at the 34th Gen. Assembly of the Italian Soc. of Exptl. Biol., Sorrento, Italy, 30 Sep.-2 Oct. 1965
(EUR-2628.i)

In the rat, the increase in the excretion of glucuronides induced by the oral administration of α -methylnaphthalene was found to be reduced by half if the animal were previously X-irradiated. Some of the possible causes are examined and discussed. Author

N66-21277# European Atomic Energy Community, Brussels (Belgium). Biology Dept.

GLUCURONIDE EXCRETION IN THE URINE OF IRRADIATED RATS [ESCREZIONE DI GLUCURONIDI URINARI NEL RATTO IRRADIATO]

P. Scoppa and K. Gerbaulet Feb. 1966 13 p refs In ITALIAN; ENGLISH Presented at the 34th Gen. Assembly of the Italian Soc. of Exptl. Biol., Sorrento, Italy, 30 Sep.-2 Oct. 1965
(EUR-2638.i)

The urinary excretion of total glucuronides is strongly reduced in the rat exposed to sublethal X-irradiation. The decreases of urinary glucuronides are examined and compared with those found in paired fed controls. Author

N66-21280# United Kingdom Atomic Energy Authority, Harwell (England). Authority Health and Safety Branch.
ENVIRONMENTAL MONITORING ASSOCIATED WITH DISCHARGES OF RADIOACTIVE WASTE DURING 1964 FROM U.K.A.E.A. ESTABLISHMENTS

Nov. 1965 35 p refs
(AHSE/RP/-R-66)

The results are given of an environmental monitoring program to confirm that the discharges of radioactive waste during 1964 from each of the principal EKA EA establishments produced no hazard in the environment. These results are summarized and are compared with derived working limits to facilitate an appreciation of the standards of safety achieved. Author

N66-21286# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio
BIOCHEMICAL AND PHYSIOLOGICAL EVALUATION OF HUMAN SUBJECTS WEARING PRESSURE SUITS UNDER SIMULATED AEROSPACE CONDITIONS Final Report, Aug. 1963-Jun. 1966

K. J. Smith, E. W. Speckmann, Marilyn E. George, G. M. Homer, and D. Wiltzie Dunco (Miami Valley Hosp. Res. Dept.) Oct. 1965 50 p refs

(AMRL-TR-65-147; AD-626619) CFSTI: HC \$2.00/MF \$0.50

A series of experiments has been designed to determine the water, energy, and protein requirements of man under various simulated aerospace conditions. The experiment described measured the effects of wearing a MA-10 pressure suit continuously for 14 days on the aforementioned measurements. A freshly prepared diet that closely matched proposed aerospace diets was fed to four human volunteers and coefficients of apparent digestibility and balances of the component nutrients were determined. The results showed that the wearing of unpressurized MA-10 suits under ambient conditions for 14 days did not affect the subjects' fluid intake and output. No significant changes were observed in digestibilities or balances of the nutrient components. Results indicated that the fresh food diets was very efficiently utilized. No significant changes in subject blood pressures, oral temperatures or pulse rates were observed during the experiment. All hematological and chemical analyses of blood were within the normal range and did not exhibit differences between experimental periods. The 2 day menu of fresh foods proved to very acceptable and did not decrease in acceptability during the 42 day experiment.

Author (TAB)

N66-21322# Naval Radiological Defense Lab., San Francisco, Calif.

BONE MARROW AS THE MAJOR SOURCE OF POTENTIAL IMMUNOLOGICALLY COMPETENT CELLS IN THE ADULT MOUSE

Marvin L. Tyan and Leonard J. Cole 8 Dec. 1965 12 p refs
(USNRDL-TR-946; AD-626682) CFSTI: HC \$1.00/MF \$0.50

Groups of F1 hybrid mice (A x B) were sublethally irradiated and injected with cells from various lymphoid tissues of adult parental strain (A) mice. Spleen and lymph node cells and cells from the thymus of the survivors were then injected into an F1 hybrid of another type (A x C). A significant number of deaths occurred among the secondary hosts only when they had received spleen cells from mice which had been injected with adult bone-marrow cells. Author (TAB)

N66-21369# Dunlap and Associates, Inc., Washington, D. C.
HANDBOOK FOR THE CONSIDERATION OF TRAINING FUNCTIONS DURING DESIGN OF OPERATIONAL EQUIPMENT

R. Gebhard, J. M. Gradijan, and F. A. Brooks, Jr. Port Washington, N. Y., Naval Training Device Center, 8 Jul. 1965 82 p (Contract N61339-1450)

(NAVTRADEVCE-1450-2; AD-625828) CFSTI: HC \$3.00/MF \$0.75

The handbook was prepared on a one-year study of how training considerations should be made during operational system design. For many systems, categories of operations can be defined according to whether on-system practice will normally be provided during mission fulfillment; can be provided at some degradation to mission or equipment; can be provided if additional equipment (not essential to functioning of the basic machine) simulates the external environment, or can be provided if internal state modification possibilities have been incorporated into the basic machine. Beyond this

operation categorization scheme, many factors, called training trade-offs, which must be considered in the allocation of training resources are discussed. Author (TAB)

N66-21392# Air Force Systems Command, Bedford, Mass. Decision Sciences Lab.

EFFECT OF INTENSITY CHANGES IN AUXILIARY STIMULI ON AUDITORY AND VISUAL SIGNAL DETECTION

William H. Watkins Dec. 1965 63 p
(ESD-TR-66-121; AD-628188) CFSTI: HC \$3.00/MF \$0.75

Results of automated tone detection experiments are reported. Subjects were required to identify one of four short intervals as having contained a weak, earphone-presented, auditory signal. These experiments involved approximately 20,000 trials. Each experiment employed at least two lighting conditions. In general, when the light source intensified during the intervals, detection was superior to that occurring when the light diminished at corresponding times. The findings are compared with the results of analogous experiments involving visual signal detection under several conditions of auditory stimulation. Some possible explanations for consistencies in the two kinds of experiments are considered, and individual differences are discussed. Author (TAB)

N66-21402# Aktiebolaget Atomenergi, Stockholm (Sweden). **TRACE ELEMENTS IN HUMAN MYOCARDIAL INFARCTION DETERMINED BY NEUTRON ACTIVATION ANALYSIS**

P. O. Wester May 1965 39 p refs
(AE-188) CFSTI: HC \$2.00/MF \$0.50

A recently developed ion-exchange technique, combined with subsequent γ -spectrometry, is used. The following trace elements are determined: Ag, As, Au, Ba, Br, Ca, Cd, Ce, Co, Cr, Cs, Cu, Fe, Hg, La, Mo, Rb, Sb, Sc, Se, Sm, Zn and W. In the injured tissue compared to the uninjured, calculation on a wet weight basis showed a decrease in Co, Cs, K, Mo, P, Rb and Zn, and an increase in Br, Ca, Ce, La, Na, Sb and Sm. The differences in Ca, La, Mo, P and Zn are dependent on the age of the myocardial infarction, and the regression lines for these elements are given. The concentration of the trace elements in uninjured tissue from infarcted hearts is compared to the concentration of these elements in normal heart tissue, determined in a previous study. In the uninjured tissue from infarcted hearts a decrease is found in Cu and Mo, and an increase in As and Ce. Author

N66-21406# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF GENERAL CHILLING AND HIBERNATION ON THE RESTORATION OF VITAL FUNCTIONS IN ANIMALS AFTER CLINICAL DEATH DUE TO ACUTE LOSS OF BLOOD

V. I. Soboleva 28 Sep. 1965 20 p refs Transl. into ENGLISH from Patol. Fiziol. i Eksperim. Terapiya (Moscow), v. 6, no. 1, 1962 p 28-33
(FTD-TT-65-674/1; AD-622350)

Conclusions: If the terminal state in the animal develops against a background of hibernation of combined hibernation and hypothermia, subsequent restoration of the vital functions by means of arterial infusion is difficult, and even becomes impossible in a number of cases. Lowered or nullified effectiveness of arterial blood infusion on development of the terminal state under the conditions of hibernation can be accounted for by inactivation of the nervous mechanisms regulating the cardiovascular system under the influence of the neuroplegic preparations. The detrimental effect of the hibernation mixture might also be linked to an aggravating effect

of the lytic preparations on the profound inhibition of the central and vegetative nervous systems that prevails in extreme stages of mortification, with the result that the resuscitation process becomes more difficult. Author (TAB)

N66-21412# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INCREASE IN THE EXTENSOR TONUS IN CATS WITH FULLY AND PARTIALLY EXCISED CEREBELLUM DURING WEIGHTLESSNESS

O. G. Gzenko, R. A. Grigor'yan et al 20 Oct. 1965 21 p refs Transl. into ENGLISH from Byull. Eksptl. Biol. i Med. (Moscow), v. 60, no. 7, 1965 p 7-12
(FTD-TT-65-1554/1+2+4; AD-623272)

Two cats, one with partially excised cerebellum and the other with fully excised cerebellum, were observed for their late and motor reactions in weightlessness during parabolic flights. The vestibular status of the animals was studied by photographic recording of their lifting reflexes of the head and extremities, their readiness to jump, as well as their turning and adjusting reflexes. Cats with fully or partially excised cerebellum showed extensor rigidity of the trunk, neck, rear extremities, and especially the front extremities for the duration of the weightlessness state that much exceeded analogous tonus changes in control animals. Similar symptoms in normal animals were expressed to a lesser degree and disappeared with adaption to the weightlessness condition. G.G.

N66-21421# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

MICROBIOLOGIC SAMPLING FOR HUMAN SUBJECTS

Arselus West Dec. 1965 25 p refs
(AMRL-TR-65-192; AD-627928) CFSTI: HC \$1.00/MF \$0.50

The restricted environment of a space vehicle and the stresses of space flight have made necessary the establishment of microbiologic tolerance limits. A graphic outline is presented for the microbiologic sampling of human subjects to determine the composition of their indigenous microflora. The types of microorganisms to be expected and the culture media to be used are given for various body areas.

Author (TAB)

N66-21451 Joint Publications Research Service, Washington, D. C.

ON "MAN-MACHINE" SYSTEM

Hsu-yen Tu *In its* Transl. on Communist China's Sci. and Tech. 10 Mar. 1966 p 70-78 Transl. into ENGLISH from K'o Hsueh T'ung Pao (Peking), no. 12, Dec. 1965 p 1043-1049 (See N66-21446 11-05) CFSTI: \$3.00

The human factors in the man-cycle of the man-machine system were studied in an effort to overcome man-machine maladjustment and to reach a man-machine harmony for more reliable, effective, efficient, and economic operations. Mathematical and theoretical analyses were only considered as complementary methods. Simulated systems were proposed for studying man's decision making and the development of the mechanical characteristics of the machine while the limiting conditions of man remain. Cooperation of experts in the field of biology, psychology, medicine, automation, mechanics, electronics, etc., were advocated. G.G.

N66-21452# Sperry Rand Research Center, Sudbury, Mass. **EVALUATION OF SPEECH PROCESSING DEVICES. I: INTELLIGIBILITY, QUALITY, SPEAKER RECOGNIZABILITY** Final Report, 1 Jun. 1964-31 Jul. 1965

William D. Voiers, Marion F. Cohen, and Juozas Mickunas 31 Jul. 1965 169 p refs
(Contract AF 19(628)-4195)
(SRRC-RR-65-94; AFCRL-65-826, AD-627320) CFSTI: HC \$5.00/MF \$1.00

Three bases of evaluation are dealt with: intelligibility, speaker recognizability and aesthetic acceptability or quality. A two-choice diagnostic rhyme test for the transmission of consonant information has been developed. It yields a total intelligibility score plus diagnostic scores relating to the fidelity with which seven binary attributes of consonant phonemes are transmitted to the ear of the listener. These attributes are voicing, nasality, duration and frication (as opposed to plosion) i.e., front (as opposed to middle) middle (as opposed to back) and back (as opposed to front). For treating the problem of speaker recognizability, procedures have been developed by means of which listeners' ratings of voices on various perceived acoustic traits can be analyzed to predict speaker recognizability under any given transmission condition. The problem of evaluating the aesthetic acceptability or quality of transmitted speech is treated by means of the standard unit-variance method. Primary emphasis is placed upon the contributions of the channel to the quality of the received speech. However, the method is adaptable for purposes of studying qualitative variation attributable to the source (i.e., the speaker). Author (TAB)

N66-21472# General Electric Co., Oklahoma City, Okla.
A MATHEMATICAL MODEL OF FLASHBLINDNESS Final Report, 1 Nov. 1964-31 Aug. 1965

Robert S. Czeh, Arthur W. Casper, and Ernest C. Segraves, Jr. Brooks AFB, Tex., School of Aerospace Med., Oct. 1965 68 p refs

(Contract AF 41(609)-2644)
(AD-627332) CFSTI: HC \$3.00/MF \$0.75

In planning certain military missions it is desirable to know the extent to which vision may be impaired by the flashblindness that can result from the intense light of a nuclear explosion. This report describes an attempt to provide assistance to such planning by constructing a mathematical model of flashblindness. The literature was surveyed to determine whether or not the construction of a model was feasible. Using selected data, two equations were developed for predicting recovery time from flash energy, display luminance, and display visual acuity. The prediction errors made were determined in a few situations and compared with the errors made by other prediction techniques. Limitations of the applicability of the equations were noted. Author (TAB)

N66-21489# Air Force Systems Command, Kirtland AFB, N. Mex. Air Force Weapons Lab.

EFFECTS OF RADIATION ON SOME SERUM ENZYMES AND TRACE ELEMENTS IN LARGE ANIMALS Technical Summary Report, 1 Apr. 1962-7 Jun. 1965

William S. Riggsby, Norman D. Jones, and William R. Godden Jan. 1966 38 p refs Prepared in cooperation with Omaha Veterans Admin. Hosp.

(Contract AF 29(601)-62-5217)
(AFWL-TR-65-112, AD-627862) CFSTI: HC \$2.00/MF \$0.50

This report summarizes the results of determinations of serum zinc, copper, malic dehydrogenase (MDH), lactic dehydrogenase (LDH), glutamicoxalacetic transaminase (SGOT), and glutamicpyruvic transaminase (SGPT) in large mammals following various types and doses of radiation. The principal subjects were mature sheep although beagle dogs and 'miniature' swine were also used. The radiation sources were a cobalt-60 teletherapy unit, a 250-kvp X-ray therapy unit, and a Godiva II pulsed fission-spectrum neutron reactor. Results

indicate that the quantity and type of irradiation received by these animals cannot be determined from these parameters. Author (TAB)

N66-21563# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

TRANSONIC WIND-TUNNEL INVESTIGATION OF THE EFFECT OF CONTROL SPAN AND LARGE WING-TIP NACELLES ON EFFECTIVENESS OF SPOILER-SLOT-DEFLECTOR CONTROLS ON AN UNSWEPT-WING FIGHTER-TYPE AIRPLANE

Dewey E. Wornom Washington, NASA, May 1960 34 p refs
(NASA-TM-X-280) CFSTI: HC \$2.00/MF \$0.50 CSCL 01A
(Declassified)

Six-component force and moment data were obtained through an angle of attack range of about -6 to 16° in order to determine the effect of control span and large-wing-tip nacelles on spoiler-slot-deflector effectiveness. Complete control extended from 29 to 86% of the wing semispan, and was located between the 80 and 94% chord lines. The unswept wing of the fighter-type aircraft had an aspect ratio of 2.42 and a taper ratio of 0.433. At low angles of attack, the outboard two-thirds control span was nearly as effective as complete control. At high angles of attack and at Mach numbers below 0.95 all control span lost effectiveness. Wing-tip nacelles increased the rolling moment coefficient except at angles of attack above about 7° for Mach numbers 0.90 and below. Testing was in an 8-foot transonic pressure tunnel at Mach numbers between 0.60 to 1.20. M.W.R.

N66-21564# Lockheed Missiles and Space Co., Sunnyvale, Calif.

STUDY OF SPACECRAFT ON-BOARD TEST AND DATA PROCESSING TECHNIQUES Final Summary Report Dec. 1965 32 p

(Contract NAS2-2479)
(NASA-CR-71611; LMSC-4-05-65-5) CFSTI: HC \$2.00/MF \$0.50 CSCL 06B

State-of-the-art biological instrumentation and on-board data processing for biological space missions are surveyed in order to project requirements for future missions and to postulate the necessary data system configurations. Emphasis is placed on the assessment of data loads imposed on the telemetry system by various information sources. An analysis is presented of redundancy-reduction methods found during the survey, and advanced data compression techniques have provided three distinct levels of compression. M.W.R.

N66-21581 Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div.

SHIELDING AN ASTRONAUT AGAINST ELECTRONS AND BREMSSTRAHLUNG IN THE TERRESTRIAL RADIATION BELT

Ye. Ye. Kovalev, D. P. Osanov, G. B. Radziyevskiy, A. D. Mel'nik In its Cosmic Res., Vol. 3, No. 5 20 Jan. 1966 p 190-202 refs (See N66-21566 11-30) CFSTI: HC \$6.00/MF \$1.25

Consideration is given to the shielding of an astronaut against electrons and bremsstrahlung of the terrestrial radiation belt. There is a discussion of the methodological problems involved in the design of the shielding, and problems associated with the selection of the criteria to evaluate the radiation danger, and the features of shielding geometry. A design is presented for the shielding of an astronaut situated in the radiation belt outside of his vehicle. Experimental data on the depth distribution of electron doses in light-atom materials are used in the calculations. The possibility of using

a uniform dose distribution for electrons in the energy interval up to 3 MeV is demonstrated. Estimates are also presented of the tissue doses of bremsstrahlung formed by electrons in the shielding shell. Author

N66-21582# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

RADIOBIOLOGICAL EFFECTS IN ANIMALS PREVIOUSLY SUBJECTED TO ACCELERATION

B. I. Davydov, V. V. Antipov, N. I. Konnova, and P. P. Saksonov *In its Cosmic Res.*, Vol. 3, No. 5 20 Jan. 1966 p 203-215 refs (See N66-21566 11-30) CFSTI: HC \$6.00/MF \$1.25

The reaction of mice to ionizing radiation after preliminary subjection to acceleration was studied. Evaluation of the lethality curves by the probit method indicated that on combined application of acceleration and irradiation the $DL_{50/30}$ is approximately 100r higher than after irradiation alone. However, the average survival time of the animals that perished after irradiation with a dose of 750r (during 30 days of observation) was shorter if they had been first subjected to acceleration. The difference in the average weights of the spleen and thymus of irradiated animals that had been accelerated was statistically unreliable. However, the coefficients of variation of the weights of these organs were higher on the 3rd, 7th, and 15th days after irradiation in the animals that had been irradiated after centrifuging. Radiation leucopenia was less distinct when both acceleration and ionizing radiation were administered. The possible mechanisms of the modifying action of acceleration in radiation injury to the animals are discussed. Author

N66-21583 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF CERTAIN SPACEFLIGHT FACTORS ON THE HEREDITARY STRUCTURES OF MAMMALS

M. A. Arsen'yeva, L. A. Belyayeva, Yu. S. Demin, G. L. Pokrovskaia, A. V. Golovkina et al. *In its Cosmic Res.*, Vol. 3, No. 5 20 Jan. 1966 p 216-234 refs (See N66-21566 11-30) CFSTI: HC \$6.00/MF \$1.25

The effects of vibration and acceleration (of varying duration and intensity), and the combined action of these factors with radiation on the hereditary structures of mammals were studied. It was shown that such dynamic factors as vibration and acceleration cause certain disturbances in the nuclei of bone marrow and spleen cells, and modify the effect of radiation when it is combined with other factors. Author

N66-21606# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EARLY DIAGNOSIS OF ACUTE RADIATION SICKNESS

Selected Articles
S. N. Ledanova, ed. 18 Oct. 1965 245 p refs Transl. into ENGLISH from the book "K Voprosam Ranney Diagnostiki Ostroy Luchevoy Bolezni," Kiev, Gos. Med. Izd-Vo USSR, 1962 p 1-4, 16-28, 62-94, 103-139, 147-168, 174-232 (FTD-TT-65-589/1+2; AD-625779) CFSTI: HC \$6.00/MF \$1.25

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16. MORPHOLOGICAL CHANGES IN SUDDEN DEATH FROM RADIATION AND DEATH FROM SO-CALLED RADIATION SHOCK L. V. Funshteyn and P. V. Sipovskiy p 190-203 refs (See N66-21622 11-04)

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N66-21607# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

STUDY OF EARLY CHANGES IN BLOOD PROTEINS BY THE POLAROGRAPHIC METHOD FOLLOWING WHOLE-BODY IRRADIATION

E. M. Momotuk *In its* Early Diagn. of Acute Radiation Sickness 18 Oct. 1965 p 1-10 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Polarographic analyses were used to study changes in the total number of sulfhydryl and disulfide groups in the blood proteins of white rats following irradiation, and to evaluate the occurrence of more profound oxidative reactions than the transformation of -SH to -S-S- protein groups. This method consists of finding the concentration point at which the protein waves are of equal height, and the characterization of this point of wave equality (PWE) by both its height and protein concentration. These indices are dependent only on protein structure. It was found that the change in thiol and disulfide immediately after irradiation is not related protein fraction, and it is assumed that secondary compensatory responses in the organism result in the reduction of previously oxidized thiol and disulfide groups. It is further assumed that some structural changes occur in the organism's proteins following irradiation, and that there are also changes in the separate functional groups in the protein molecules. M.W.R.

N66-21608# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

STUDY OF SORPTION PROPERTIES OF SERUM PROTEINS IN THE EARLY STAGES OF EXPERIMENTAL RADIATION INJURY

L. A. Frenkel *In its* Early Diagn. of Acute Radiation Sickness 18 Oct. 1965 p 11-19 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

A study was undertaken to determine energy-structure modifications in the surface structures of the serum protein complex following exposure to ionizing radiation and to detect any changes in protein sorption properties during actual development of dose-dependent radiation damage. To accomplish this, rabbits were subjected to single whole-body irradiation doses of 200 and 800 r. Data presented indicate that statistically significant disturbances in the stability of serum protein surface structures begin within a few hours after irradiation and continue for an entire month. A definite correlation was found between observed disturbances and radiation dose, both in the nature of the processes and in the absolute values of the stability changes. It is believed that these energy-structure disturbances are among the early physicochemical responses to radiation, and these changes in the sorption properties of the serum proteins which accompany radiation sickness may have possible use as in diagnostic procedures. M.W.R.

N66-21609# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE DYNAMICS OF HISTOCHEMICAL AND MORPHOLOGICAL CHANGES IN THE INTERNAL ORGANS OF ANIMALS DURING THE EARLY STAGE AFTER WHOLE-BODY X-RAY IRRADIATION

I. M. Peysakhovich, Ya. M. Telengater, and P. Ya. Sologub *In its* Early Diagn. of Acute Radiation Sickness 18 Oct. 1965 p 20-43 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Cytochemical and structural changes in nucleoproteins in the spleen and mucous membrane of the small intestine are found to occur within 10 to 30 minutes after white rats are exposed to large doses (900 to 1000 r) of X-rays. Changes in the liver are of a smaller order. Decrease in DNA and RNA content and mucous membranes occurs later and at a slower

rate with doses of 500 r. Other changes noted for large radiation doses are: (1) an immediate increase in phosphatase activity which is followed by a decrease, (2) a rapid disappearance of ascorbic acid in the adrenal glands, (3) decrease in sulfhydryl groups in the liver and spleen, and (4) a decrease in glycogen content in liver cells. These various disturbances which develop in the early stages following large-dose irradiation indicate that numerous pathological processes weaken the reactivity of the organism and produce radiation sickness. M.W.R.

N66-21610# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHANGES IN NITROGEN METABOLISM DURING ACUTE EXPERIMENTAL RADIATION SICKNESS INDUCED BY THE ADMINISTRATION OF RADIOACTIVE PHOSPHORUS

M. Ya. Boyarintseva *In its* Early Diagn. of Acute Radiation Sickness 18 Oct. 1965 p 44-51 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Nitrogen metabolism during radiation sickness resulting from internal doses of radioactive phosphorus is investigated in rabbits by studying blood proteins, residual nitrogen, and urea in the blood plasma and total nitrogen, urea, and ammonia in the urine. It was found that a single subcutaneous administration of 2.5 microcuries/kg produced acute radiation sickness, which was accompanied by an increase in all the blood plasma measurements. An increase in the urine measurements occurred during the course of radiation sickness. These findings confirm the opinion that intensified decomposition of proteins occurs during acute radiation sickness. M.W.R.

N66-21611# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE PROBLEM OF HEAT AND GAS EXCHANGE DURING ACUTE RADIATION SICKNESS

G. A. Levchuk and V. S. Bogdanovich *In its* Early Diagn. of Acute Radiation Sickness 18 Oct. 1965 p 52-66 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Rabbits and dogs were subjected to various radiation dosages in a study of heat and gas exchange during acute radiation sickness. Within 30 minutes after exposure to 450, 650, and 900 r, most rabbits exhibited increased temperature; femoral muscle and rectal temperatures increased about 1.1°C, while skin and mucous membranes of the upper respiratory tract about 1.5°C. These increases were accompanied by a considerable quickening of respiration and pulse and a dilatation of peripheral vessels. A regular pattern of temperature reduction was observed on the second day after radiation exposure; by the third to fifth days, for each of the dosages, temperatures dropped to initial or lower values. At doses of 900 r, some of the rabbits exhibited temperature drops either immediately or within three hours; for these animals, shock-like reactions developed and death usually followed. A clear dependence on radiation dose was noted in the study of thermatopography and basal metabolism in dogs. Basal metabolism reached its highest rate during the climax of radiation sickness; and temperatures and metabolism returned to normal during recovery. M.W.R.

N66-21612 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EARLY CHANGE IN THE BLOOD DURING ACUTE RADIATION SICKNESS IN RATS

Sh. A. Burshteyn *In its* Early Diagn. of Acute Radiation Sickness 18 Oct. 1965 p 67-77 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

White rats were subjected to single whole-body irradiation ranging from 150 to 1200 r in order to determine various blood indices. A leukopenic reaction of the blood is common to all the dosages, and leukocyte count drops one hour after irradiation between 33 and 40% for the various dosages. There appears to be no direct correlation between this blood index and the severity of radiation sickness. More drastic reduction in leukocyte counts occurs with time, and it is concluded that a serious leukopenic condition sets in as early as 24 hours after irradiation. No relationship was established between changes in quantity of lymphocytes and strength of radiation dose; lymphopenia developed and increased during the periods following irradiation for all the dosages given. Blood smears of the experimental rats revealed giant hyper-segmented neutrophils, vacuolization of the nucleus and protoplasm of the cells, cytolysis, lysis, pyknosis of the nucleus, granularity in the protoplasm of neutrophils, lymphocytes with division of the nucleus, and very small forms of lymphocytes and neutrophils.

M.W.R.

N66-21613 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHANGE IN THE DIAMETER OF ERYTHROCYTES DURING THE EARLY PERIOD OF ACUTE RADIATION SICKNESS
Sh. A. Burshteyn and N. A. Tsybenko *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 78-86 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Experiments with female white rats indicate that whole-body X-ray irradiation causes a decrease in the diameter of erythrocytes during the early stages of radiation sickness. The time of onset of microcytosis is generally dependent upon the radiation dose. For absolutely lethal doses, smaller diameters are seen after 24 hours, whereas with smaller doses the same changes do not begin until 48 or 72 hours. It is assumed that the change in diameter of erythrocytes during radiation injury is affected by factors associated with the cells themselves, the ambient medium, condition of the blood system, and impairment of the nervous system. Qualitative changes in erythrocytes were also observed, and these changes are considered early indicators of functional inadequacy of the red blood cells during radiation sickness.

M.W.R.

N66-21614 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EFFECT OF BLOOD LOSS ON CHANGES IN THE PERIPHERAL BLOOD DURING RADIATION SICKNESS
V. F. Cherkasov *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 87-99 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Leukocyte count in the peripheral blood of cats subjected to both whole-body X-ray irradiation of 400 r and blood loss was found to be somewhat higher than for those exposed to the radiation alone. The difference was clearly shown beginning with the fifth day following exposure, and it is assumed that the leukopoietic function of the hemogenetic system is preserved somewhat longer by the combined effect. A reduction in the number of erythrocytes is noted one day after irradiation, and this is followed by an increase on the fifth day and a more or less significant reduction by the 10th day. When subjected both to irradiation and blood loss, there is a loss in number of erythrocytes which begins on the first day and continues through the 15th day. Changes in amount of hemoglobin correspond the erythrocytes changes for both groups. While there is a higher survival rate for animals that are subjected to both irradiation and blood loss, this difference cannot be explained by changes which occur in the blood.

M.W.R.

N66-21615 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CHANGES IN THE REACTIVITY OF THE BLOOD SYSTEM DURING RADIATION SICKNESS
Ye. I. Komarov *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 100-117 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

The distortion in leukocyte reactions during radiation sickness, even when leukopenia has not yet developed, is considered of value as a diagnostic tool. The combination of an increase in eosinophil number and leukopenic reaction can serve as a good indicator of radiation sickness as well as a test for determining the function of the hypophyso-adrenal system following ionizing radiation exposure. Whole-body X-ray irradiation of cats brought about clear changes in alimentary reaction during the first two days, either the absence of alimentary leukocytosis or a decrease in leukocyte count. By the end of one month of radiation sickness unstable leukocyte reactions were noted; there was rapid alternation of leukocytotic and leukopenic phases as well increased leukocyte reactions; stable normal alimentary reactions were not restored until the sixth or seventh month after irradiation with 16 to 19 r/min in air at a distance of 60 cm. A total dose of 300 r caused death in 15 to 20% of the animals within a month following exposure. Studies were made of the effect of milk and adrenalin injections on leukocyte reactions, from which it was concluded that the leukocyte reactions following radiation are not significantly related to the sensitivity of the mechanoreceptors of the stomach.

M.W.R.

N66-21616 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

REACTION OF THE WHITE BLOOD CELLS TO GLUCOSE INJECTION WITH MULTIPLE IRRADIATION
I. V. Remizova *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 118-126 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

In rabbits subjected to multiple X-ray irradiation over prolonged periods of time, at a single dosage rate of 3.33 r/min, a 5ml intravenous injection of 40% glucose solution produces changes both in intensity and character. Periods of intensified reaction alternate with periods of diminished reaction. Sometimes a leukopenic reaction is observed in which leukocyte count remains below the initial value. It is concluded that a sharply intensified leukocyte reaction accompanied with marked leukopenia may indicate a continuing, although altered, capacity of the blood system to react to a given stimulant. It is also noted that an intensified leukocyte reaction is often accompanied by a low leukocyte count, and that the reaction of irradiated animals to the glucose does not present a constant picture.

M.W.R.

N66-21617 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COAGULABILITY OF BLOOD AND BRITTLENESS OF CUTANEOUS VESSELS IN THE EARLY STAGES OF ACUTE RADIATION SICKNESS IN RATS
A. K. Arnautov *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 127-137 refs Presented at the Sci. Conf. of the Kharkov Inst. of Med. Radiol., 30 Dec. 1957 (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Blood coagulability of the cutaneous vessels in rats is found to slow down within one hour after whole-body X-ray irradiations of between 150 and 1500 r. Some relationship between coagulation and dose size is reported during the first three days after exposure; for doses of 600 r and below, there is an increase of 1.75 to 2.2 times the initial level after 72 hours; for doses of 750 r and greater the increase, which is

more gradual, reaches three to four times the initial value at the end of three days. Brittleness of subcutaneous vessels is lowered during the first three to four days after exposure for all of the dosages; an increase in brittleness is reported to occur sooner for the higher than lower dosages. At doses of 750 r and greater, the hemorrhagic syndrome does not begin to develop until the fifth to seventh day following exposure which is after the period of nerve-reflex disturbances of the vascular tone has ended and after coagulation has returned to its initial value. M.W.R.

N66-21618 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EARLY CHANGES IN CHRONAXIA AND ACCOMMODATION IN ANIMALS WITH ACUTE RADIATION SICKNESS

I. A. Kogan *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 138-151 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Chronaxy in irradiated rats appears to be more related to time than to dosage, and changes, which usually occur within an hour after exposure, take the form of lengthening of chronaxy and increasing the accommodation parameter. Such changes are considered to indicate deterioration of the functional properties of the nerves. In both rats and rabbits, a two-phase change is observed in the nerves. Small doses, 100 and 200 r, produce a deterioration of functional properties; doses of 400 and 800 r produce a certain normalization in the index of chronaxy as well as improvement in accommodation; and there is a renewed degree of deterioration from larger doses. It is suggested that small doses affect the central nervous system; increasing doses may lead to excessive inhibition of the centers and less effect on the periphery; further increase may have a direct effect on the peripheral motor nerves to cause additional deterioration. M.W.R.

N66-21619 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EFFECT OF IONIZING RADIATION ON THE FUNCTIONING OF THE GASTROINTESTINAL TRACT DURING EXPERIMENTATION

Ye. A. Brodskaya *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 152-158 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Four dogs with Basov's fistula were used to study functioning of the stomach and small intestine under conditions of subacute radiation sickness, both when clinical symptoms were manifested and after recovery. Investigations made over periods of between eight and 16 months after radiation exposure indicated that the sharpest disturbances in the functioning of the gastrointestinal tract were observed after the disappearance of clinical symptoms when the blood indices returned to their initial values. Both in the latent period and when leukopenia and lymphopenia are at a maximum, the gastrointestinal tract appears to function better than during the period of clinical well-being. It is further found that the functioning of the stomach and small intestine were more impaired during the first hour of gastric secretion following exposure than the second. M.W.R.

N66-21620 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

HISTOCHEMISTRY OF NUCLEIN EXCHANGE IN THE BLOOD-FORMING ORGANS OF ANIMALS DURING ACUTE RADIATION SICKNESS

O. M. Nosalevich and G. S. Kolesnikova *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 159-176 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Changes in DNA and RNA were studied during acute radiation sickness in rats exposed to single whole-body X-ray doses between 450 and 1200 r. The rats were decapitated at one, 24, 48, and 72 hours after irradiation; and the presence of radiation sickness was confirmed by the appearance of the animals, body weight loss, pathological and anatomical dissection data, and changes in blood and blood-forming organs. Morphological changes in the spleen are apparently related to dosage size; for large doses, RNA content decreases more markedly during the 72-hour period than does DNA content; at smaller doses, DNA content hardly changes, whereas RNA decreases in an undulating manner. With doses of 1050 and 1200 r, DNA decrease in bone marrow is considerably less pronounced than the decrease in quantity of cell elements; with smaller doses, no DNA decrease is reported and RNA increases considerably. A study increase in DNA content of the lymph nodes is observed for all dosages. At 450 and 900 r, the follicles of the spleen exhibit both destructive changes and regenerative processes. M.W.R.

N66-21621# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MORPHOLOGICAL AND HISTOCHEMICAL CHANGES IN THE TISSUE OF THE ADRENALS DURING ACUTE RADIATION SICKNESS

O. M. Nosalevich and G. S. Kolesnikova *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 177-189 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

A change in the weight of adrenal glands and a decrease in the quantity of cholesterol and sudanophilic fat is observed during the first three days of exposure of rats to single whole-body X-ray irradiation in doses of 1200, 1050, and 900 r. The changes which occur indicate intensified activity of the hormones as well as wasting of the adrenal cortex. As radiation dose is increased there is an accompanying drop in the content of the nucleic acids in the adrenal glands. Functional reactions in the adrenals appear immediately after irradiation, while morphological changes do not occur until later. M.W.R.

N66-21622 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MORPHOLOGICAL CHANGES IN SUDDEN DEATH FROM RADIATION AND DEATH FROM SO-CALLED RADIATION SHOCK

L. V. Funshteyn and P. V. Sipovskiy *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 190-203 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Rabbits and guinea pigs were studied following large doses of X-ray irradiation in order to identify the phenomena which cause sudden death from radiation sickness. Some of the animals died during irradiation, while others lived as long as 12 days. It is noted that as the lifetime of the exposed animals increases, leukocyte count in the various organs drops; within 3.5 to 12 days after radiation, leukocytes are no longer detected. Various tissue elements reacted differently to the radiation effects. In cases of early death, dissections revealed congested plethora of the vessels and hemorrhages of the blood-forming and parenchymatous organs. Similar findings resulted with animals that died during exposure; for these, multiple hemorrhages in the lungs were generally detected. There was a similarity of such changes as well as in bone marrow and lymph nodes of animals who died at various intervals following exposure. Microscopic changes in internal organs did not generally vary either. M.W.R.

N66-21623 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON METHODS OF EXPERIMENTALLY PRODUCING ACUTE RADIATION SICKNESS

V. I. Kulinskiy *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 204-212 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Dose distribution over the irradiation field, determination of the surface dose, and the qualitative characteristics of radiation are discussed in connection with the experimental production of acute radiation sickness. Specifications are developed which permit the standardization of procedures for inducing acute symptoms in rabbits by using a one-tube apparatus. Under the proposed conditions, X-ray irradiation with 196 kv and filters of 0.5 mm Cu and one mm Al has a first half-value layer of 1.08 mm Cu and a second of 1.7 mm Cu. M.W.R.

N66-21624 Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CYLINDER AND FLAT PROPORTIONAL COUNTERS, THEIR INVESTIGATION AND APPLICATION

M. N. D'yachenko *In its Early Diagn. of Acute Radiation Sickness* 18 Oct. 1965 p 213-227 refs (See N66-21606 11-04) CFSTI: HC \$6.00/MF \$1.25

Extremely small quantities of radium and other radioactive substances in the human organism can be determined by measuring the alpha activity of the blood and urine. The cylindrical and flat proportional counters used for this purpose can also be applied to measuring the concentrations of alpha-active substances and other radioactivity in the atmosphere. Such counters, which have large active surfaces and a small background, operate stably in the same way as neutron detectors and dosimeters. There are layers of boron on the inside and surfaces. Design of these counters is discussed; along with the influence of the photoeffect, electronegative molecules, and space charges on gas amplification. M.W.R.

N66-21680* Maryland Univ., Baltimore. Psychiatric Inst. **MOLECULAR BINDING IN THE CELL SURFACE** Progress Report, Period Ending 31 Dec. 1965

Robert G. Grenell [1965] 20 p refs (Grant NGR-21-002-040)

(NASA-CR-71544) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

Detailed are salient constructional features of a microwave absorption cavity, derived from Vogelhut, to be used in proposed bound-water experiments with neuroproteins. Adaptations of existing hardware are indicated where they have been applied. An improved klystron oscillator system is proposed, and the instrumentation for digitalized readout of cavity characteristics is discussed. Appended are approximate costs and a suggested schedule for experimental stages in the proposed investigation. Briefly discussed are the applications of current techniques in NMR and Electron Paramagnetic Resonance Spectroscopy to molecular characteristics of membrane protein and protein residues. The tentative evaluation indicates the microwave techniques as the most promising of the current spectroscopic procedures for elucidating charged relationships and binding-site activity for a variety of orientations of the macromolecule. Hence, the construction of the absorption cavity and its initial use in an existing microwave system was proposed. Author

N66-21681* California Univ., Berkeley. Space Sciences Lab.

BASE COMPOSITION OF INTACT NUCLEIC ACID OLIGOMERS

Stanley Mandeles and Charles R. Cantor [1966] 24 p refs Submitted for Publication

(Grants NsG-479; NIH-GM-12158-02)

(NASA-CR-71555) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

The base composition of intact, purified, oligonucleotides was determined by comparing the absorption spectrum of each oligomer with calculated curves. The spectral curve of each oligomer was measured in 7 M urea at three pH values and digitized at 1 μ intervals. The calculated curves consisted of the sums of the absorption spectra of mononucleotides in 7 M urea at the same pHs. A computer was used to make the comparisons and establish the best fit. Results are presented for nine of the ten possible dimer composition isomers; trimers from pancreatic and T₁ Ribonuclease hydrolysates of TMV-RNA; poly-A, poly-C, and poly-U; and intact tobacco mosaic virus-RNA. Author

N66-21682* California Univ., Los Angeles. Space Biology Lab.

CENTRAL NERVOUS, CARDIOVASCULAR AND VISUOMOTOR STUDIES RELATING TO SPACIAL ORIENTATION IN A 30-DAY PRIMATE FLIGHT

W. R. Adey [1966] 40 p refs

(Grant NsG-502)

(NASA-CR-71556) CFSTI: HC \$2.00/MF \$0.50 CSCL 06S

An experiment is described for the monitoring of sensory, motor, and higher nervous functions that relate to visual coordination, spacial orientation, recent memory, and discriminative ability in prolonged space flight. A 6.8 kg monkey, *Macaca nemestrina*, will be tested in two behavioral tasks involving delayed matching-to-sample, and an eye-hand coordination test. Techniques for central nervous, cardiovascular, peripheral nervous, and autonomic monitoring during the thirty day primate flight in Biosatellite D are discussed. Environmental support includes an oxygen-nitrogen gas system, reward and *ad libitum* pellet feeding, and water from the fuel cell power system. Data acquisition and analysis techniques are reviewed. Relative to the experiment, central nervous mechanisms underlying orienting and visual discriminative functions are discussed and interrelations of vestibular and optic sensory influxes with cortico-diencephalic and limbic mechanisms as essential substrates for spatial orientation are reviewed. E.A.O.

N66-21744* Technisch Documentatie en Informatie Centrum Voor de Krijgsmacht, The Hague (Netherlands).

SURVEY OF LITERATURE ON MILITARY MEDICINE [LITERATUURVERZICHT MILITAIRE GENEESKUNDE]

15 Feb. 1966 28 p refs in DUTCH, ENGLISH, FRENCH, and GERMAN /*ts* Vol. 12, No. G-127

CFSTI: HC \$2.00/MF \$0.50

Contains abstracts and bibliographic notes on atomic-biologic-chemical warfare, psychology and psychiatry, air flight medicine, internal medicine, surgery, pharmacology and toxicology, radiology, and medical news. Transl. by J.O.

N66-21763* Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INFLUENCE OF ROTATION TRAINING ON MOTOR CONDITIONED REFLEXES IN RATS

S. I. Nudman 5 Nov. 1965 16 p refs Transl. into ENGLISH from Zh. Vysshei Nervnoi Deyatel'nosti (Moscow), v. 14, no. 5, 1964 p 885-891

(FTD-TT-65-969/1+2; AD-627853) CFSTI: HC \$1.00/MF \$0.50

Experiments were conducted to determine the influence of preliminary rotation on an induced system of two motor conditioned reflexes. In the investigation mature white rats, trained

to run left on presentation of an auditory signal and right on a visual signal, were rotated clockwise in a centrifuge at 60 rpm for five 12-min sessions with intervals of 1 min between sessions. Immediately after rotation, the animals were placed in the maze. In analyzing the results, it was found that rotation materially influenced higher nervous activity. Findings showed an increase in erroneous reactions, a decrease in absolutely correct and signal reactions, and a prolongation of latent period and maze-running time. There were also indications that the disruptions were more pronounced with the conditioned auditory signals than with the visual signals. M.G.J.

**N66-21796# Academy of Sciences (USSR), Moscow.
METHODS AND SOME RESULTS OF MICROBIOLOGICAL
INVESTIGATIONS OF METEORITES**

S. S. Abyzon and A. A. Imshenetsky 1964 13 p Presented at the COSPAR Symp., Florence, May 1964

Microbiological investigations were conducted on rock and meteorites to determine the possibility of the existence of microorganisms in meteorites. The experiment box consisted of two hermetic chambers with observation windows and openings for rubber gloves and a boring device. The laboratory equipment, tools and flasks with nutrient media were placed in the box and the unit sterilized. Two preliminary experiments were conducted on rocks, sterilized and then either placed in soil, or having soil and nutrient inserted in a bored channel. Microbiological analysis showed that bacteria from the soil had penetrated throughout the rock. Channels were then bored in meteorites and soil inserted as above. It was determined that bacteriological cells permeated the Sikhote-Alin iron octahedrite, Kunashak stone chondrite, and Saratov stone chondrite meteorites. The Chinge iron otomite was found to be impermeable to cells and also to air. It was concluded that microbiological studies of meteorites which had lain in soil for some time could give erroneous results. N.E.N.

N66-21800# Joint Publications Research Service, Washington, D. C.

**UTILIZATION OF RADIOTELEMETRY FOR THE STUDY OF
GASTRIC AND INTESTINAL TEMPERATURE IN MAN**

Ye. B. Babskiy, B. Ye. Votchak, and A. S. Belousov 10 Mar. 1966 12 p refs Transl. into ENGLISH from Terap. Arkh. (Moscow), v. 37, issue 11, Nov. 1965 p 96-100 (JPRS-34501; TT-66-30941) CFSTI: \$1.00

A thermal radiopill and telemetric system were used to determine the temperature in various parts of the human digestive tract. Healthy individuals were tested to establish a normal curve of temperatures. Curves were found for patients suffering from acute or chronic inflammatory processes (acute gastritis, acute colitis, and chronic ulcerative colitis). A temperature rise was observed in the corresponding localizations of the inflammation. It was concluded that radiotelemetric investigations of the temperature offer valuable data on the state of the gastrointestinal tract, and that it may determine the presence of local foci of the inflammatory process, and that the study of vascular reactions of the digestive tract is possible. N.E.N.

N66-21821*# California Univ., Los Angeles. Dept. of Anatomy

REGIONAL CEREBRAL IMPEDANCE CHANGES IN ALERTING, ORIENTING AND DISCRIMINATIVE RESPONSES; THE ROLE OF NEURONAL ELEMENTS IN THESE PHENOMENA

W. R. Adey, R. T. Kado, J. T. Mc Ilwain, and D. O. Walter [1966] 35 p refs (Grant NSG-505; NIH MH-03708; Contract AF 49(638)-1387) (NASA-CR-71549) CFSTI: HC \$2.00/MF \$0.50 CSCL 05J

Electrical impedance was measured in the hippocampus, amygdala, and midbrain reticular formation during alerting, orienting, and discriminative performances in the cat. Measurements were made in focal volumes of approximately 1.0 cmm at 1000 cycles per second with coaxial electrodes. In the fully trained animal, computed averages of hippocampal impedance decreased by as much as 8 per cent of baseline during visual discrimination, whereas alerting and orienting responses immediately preceding were not accompanied by comparable impedance changes. Similar measurements in the rostral midbrain reticular formation showed small responses during orientation and discrimination, and less constantly during alerting responses. The amygdala exhibited consistent responses only in the alerting epoch. The magnitude of the responses in hippocampus and midbrain increased with the level of behavioral performance. When behavioral cues were reversed, the hippocampal impedance response sharply increased on the first post-reversal day, but rapidly declined thereafter and disappeared. Author

N66-21824*# Douglas Aircraft Co., Inc., Santa Monica, Calif. Missile and Space Systems Div.

HUMAN ENGINEERING DESIGN CRITERIA STUDY Final Report

S. Truax, W. R. Harmer, T. J. Wong, D. L. Van Kekerix, and L. R. Uyeda 31 Jan. 1966 446 p refs (Contract NAS8-11256) (NASA-CR-71532; MSFC-STD-267A) CFSTI: HC \$7.45/MF \$2.25 CSCL 05E

The document is a human engineering design criteria study which includes design criteria for the following areas: control, display, control-display interaction, human capabilities, human responses, anthropometry, work space, illumination, vibration, noise, temperature, clothing, safety and maintainability. Check lists, rating scales and references are provided. The document is designed to be used by design engineers and by human factors engineering personnel to assist them in their design of earth launch systems. Author

N66-21828# Pisa Univ. (Italy). Inst. of Physiology.

COMPARATIVE NEUROPHYSIOLOGY OF VISION Technical (Final) Report, Sep. 15, 1964-Sep. 14, 1965

Giuseppe Moruzzi 15 Sep. 1965 10 p refs (Grant AF-EOAR-64-37)

(AFOSR-65-2011; AD-627634) CFSTI: HC \$1.00/MF \$0.50

The results of the following themes of investigation are reported: (1) Visual control of flashing in fireflies. (2) Presynaptic inhibition in cat's lateral geniculate body. (3) Influence of sleep and wakefulness on the response of lateral geniculate units to sinewave photic stimulation. (4) Effects of synchronized sleep on the response of lateral geniculate units to flashes of light. Author (TAB)

N66-21850# Goodyear Aerospace Corp., Akron, Ohio.

LIFE SUPPORT SYSTEM FOR STAY TIME EXTENSION MODULE (STEM)

F. R. Gross 20 Jan. 1965 58 p (SP-3778)

Changes and modifications to the Life Support System for the Stay Time Extension Module are described. The number of blowers for the shelter air circulating system was reduced from three to two, which will still satisfy redundancy requirements. A major change was made in the space radiator arrangement. The two space radiators previously embedded in the shelter wall were replaced by one space radiator which is independent of the shelter wall. Facilities for removing heat from the cooling vests of the astronauts were added. Cooling water is now

being circulated through the vests and a coil in the waste water evaporator. A major addition to the life support system weight is due to furnishing cooling water for the back packs of the astronauts, worn by them while exploring the moon. Carbon dioxide with molecular sieves and a dual atmosphere for the shelter, consisting of oxygen and nitrogen, was investigated. Both systems were found heavier than the original lithium hydroxide system and the single component atmosphere. These latter systems were therefore retained. Pumping the airlock down before the astronauts open the outer door was also investigated. A proposed working schedule for the astronauts is outlined. M.R.W.

**N66-21883# Texas A&M Univ., College Station.
BILATERAL REPRESENTATION OF THE HORIZONTAL
SEMICIRCULAR CANALS IN THE INFERIOR VESTIBULAR
NUCLEUS OF CATS**

John Thomas La Croix (M.S. Thesis) Aug. 1965 42 p refs
(AD-624663) CFSTI: HC \$2.00/MF \$0.50

The existence of bilateral representation was demonstrated in single units in the inferior vestibular nucleus of decerebrate, decerebellate cats by recording the spike potentials with tungsten microelectrodes. Recording electrodes one to two microns in diameter were stereotactically placed in the inferior vestibular nucleus. Recordings were made from locations where the frequency of action potentials was affected by the direction of acceleratory stimulation of the horizontal semicircular canals. The ipsilateral and contralateral eighth cranial nerves were stimulated individually by one second galvanic pulses. The individual spike potentials were amplified and recorded on moving film from the screen of a cathode ray oscilloscope. Response to electrical stimulation was demonstrated by changes in the impulse rate at the recording site. Responses were elicited by stimulation of the nerves of both sides in almost all observations. The effect of stimulation of the contralateral side was, however, usually lesser in degree than the effect in the ipsilateral side. Other effects of stimulation were also noted. The possibility that responses were due to current spread from the site of stimulation was eliminated by demonstrating the lack of response in the sectioned nerve. Electrode placements were determined histologically Author (TAB)

**N66-21889# Aerospace Research Labs., Wright-Patterson
AFB, Ohio. Hypersonic Research Lab.**

**PITOT AND STATIC PRESSURE MEASUREMENTS IN
THE SEPARATED REGION OF SPIKED CYLINDER IN
HYPERSONIC FLOW**

William G. Reinecke, H. Harvey Album, and Thomas Johani
Nov. 1965 61 p refs

(ARL-65-237; AD-628683) CFSTI: HC \$3.00/MF \$0.75

Pressure measurements were made in the region of separation induced by a sharp spike ahead of a flat faced, right circular cylinder at Mach 11.6. The pressures on the face of the cylinder were measured with both surface orifices and a traversing probe. A pitot survey was also made of the free shear layer. The results indicate that the face traversing probe did not influence the separated region greatly and gave pressure values generally in agreement with the surface orifices. The pitot probe, which was inserted farther upstream, influenced the separated region more critically, but not so much as to preclude the production of useful pitot surveys. Chapman's two-dimensional theory predicted well the maximum pressure on the model face as determined by the face traversing probe. Moreover, the tests indicated that a uniform static plateau pressure characterized the separated region. This plateau pressure was slightly Reynolds number dependent. Thus the Chapman-Körst separation and reattachment model seems generally to cover the test configuration. A simplified

analysis was made using the pitot survey of the free shear layer one body radius ahead of the model face. The results showed that the Mach number on the dividing streamline was sonic or supersonic and that the speed on the dividing streamline was from 0.4 to 0.6 of the external speed.

Author (TAB)

**N66-21890# Aerospace Medical Div. Aerospace Medical Research
Labs. (6570th), Wright-Patterson AFB, Ohio.**

**MANNED TESTING OF A SEMIPASSIVE POTASSIUM
SUPEROXIDE ATMOSPHERE CONTROL SYSTEM Final
Technical Report, Jul. 1965**

Donald A. Keating, Konrad Weiswurm, Clemens M. Meyer,
George W. Filson, and Irving H. Lantz Nov. 1965 12 p refs
Prepared in cooperation with MSA Res. Corp.

(Contract AF 33(615)-1518)

(AMRL-TR-65-194; AD-628040) CFSTI: HC \$1.00/MF \$0.50

A potassium superoxide atmosphere control system using the optimum features of passive and dynamic techniques was man-tested for 24 hours. The results demonstrate the feasibility of using a potassium superoxide system of this design for manned space missions. This semipassive technique is applicable to short missions as well as longer missions. The findings indicate that significant weight, volume, and power savings can be obtained using the semipassive technique as compared to dynamic techniques used in other solid chemical atmosphere control systems.

Author (TAB)

**N66-21906# Aviation Safety Engineering and Research,
Phoenix, Ariz.**

**IMPACT TEST METHODS FOR HELMETS. SUPPLEMENT 1
TO HELMET DESIGN CRITERIA FOR IMPROVED CRASH
SURVIVAL**

J. W. Turnbow Ft. Eustis, Va., Army Aviation Mater. Labs.,
Jan. 1966 24 p refs

(Contract DA-44-177-AMC-254(T))

(USAAVLBS-TR-65-44A, Suppl. 1; AD-628679) CFSTI:
HC \$1.00/MF \$0.50

An analysis is presented on the primary methods of impact testing crash helmets and includes certain problems associated with each test method in interpreting test results. The three basic impact test methods employ impact of a movable head-helmet assembly with a movable striking mass, impact of a movable striking mass against a fixed head-helmet assembly, and impact of a movable head-helmet assembly against a fixed anvil. The evaluation and/or comparison of helmet performance is based on the measurement of head acceleration, energy absorption capacity, and resilience. The test method selected should permit these measurements to be made simply and without bias due to helmet weight and other possible variables unless the measured quantities can be readily and accurately corrected for such bias. These analyses illustrate the effect of two variables, the mass of the test components, and the coefficient of restitution upon the energy absorption and acceleration levels.

R.N.A.

**N66-21913# Michigan Univ., Ann Arbor. Coll. of Engineer-
ing.**

**TRANSMISSION OF THE HUMAN EYE Final Report, 15
Mar. 1962-14 Aug. 1965**

E. A. Boettner and J. R. Wolter Brooks AFB, Tex., AF School
of Aerospace Med., Jan. 1966 28 p refs

(Contract AF 33(657)-8880)

(Rept.-05096-1-F; AD-628333) CFSTI: HC \$2.60/MF \$0.50

The total transmittance of light through the whole human eye has been measured at 466, 566, 666, and 800 millimicrons. The forward scattering of light in passing through the

eye was also measured. The results obtained on four of five specimens shortly after enucleation showed that the average maximum transmittance was 81.6% at 666 millimicrons. The forward scattered light outside of 1 degree was 35% = 5% for the five specimens at 566 and 666 millimicrons.

Author (TAB)

N66-21923# Naval School of Aviation Medicine, Pensacola, Fla. Naval Aerospace Medical Inst.

THE RELATIONSHIP OF THE EDWARDS PERSONAL PREFERENCE SCHEDULE TO SUCCESS IN NAVAL FLIGHT TRAINING

Floyd E. Peterson, Norman E. Lane, and Robert S. Kennedy
8 Oct. 1965 14 p refs

(NAMI-946; AD-627011) CFSTI: HC \$1.00/MF \$0.50

The Edwards Personal Preference Schedule, a forced choice personality 'need' inventory, was evaluated as a predictor of success or failure in naval flight training. The EPPS failed to discriminate between student aviators who completed training successfully and those who dropped voluntarily or failed due to poor performance.

Author (TAB)

N66-21959# Max-Planck-Institut für Biophysik, Frankfurt am Main (West Germany).

RADIATION EFFECTS ON LIVING TISSUES AND ORGANISMS. SERIES C: BIBLIOGRAPHIES, SECTION 4, NUMBER 21

W. Stahlhofen comp. Apr. 1965 92 p refs

(AED-C-04-21)

Approximately 330 references are given to reports and journals published during 1964. Separate author and subject indexes are included.

NSA

N66-21962# Utah Univ., Salt Lake City. Radiobiology Div. **RESEARCH IN RADIOBIOLOGY Annual Report of Work in Progress on the Chronic Toxicity Program**

Thomas F. Dougherty et al 31 Mar. 1965 222 p refs

(Contract AT(11-1)-119)

(COO-119-232) CFSTI: HC \$6.00/MF \$1.25

Reports are presented on various research studies conducted to determine radiobiological effects in animals. Areas covered include the use of therapy and prophylactic treatment in experimental animals; dental eruption patterns in beagles; studies of trabecular bone in beagles and humans; bioassay of cortisol influence in bones of growing rabbits; cortisol effect on Na_2CaDTPA enhanced excretion of Pu^{239} in beagles; EDTA effect on Sr^{90} and Y^{90} excretion; Th^{228} induced fractures in beagles; correlation of bone strength with radiation dose from internal emitters and bone resorption; and statistical methods for analyzing the hematological data from Sr^{90} injected beagles. Injection tables are also presented, showing the radioisotope dosage administered to the dogs, and cause of death.

M.G.J.

N66-21976# California Univ., Los Angeles. Lab. of Nuclear Medicine and Radiation Biology.

A FORTRAN IV PROGRAM FOR THE EVALUATION OF POST-IRRADIATION SURVIVAL TIMES

James L. Leitch and Nancy J. Hagen Nov. 1965 39 p refs
(Contract AT(04-1)-GEN-12)

(UCLA-12-573) CFSTI: HC \$2.00/MF \$0.50

A Fortran IV computer program was developed for the rapid evaluation of post-irradiation survival times in animals. It takes into account the cage effect between cages within the same experiment, a factor not covered by the Litchfield time-percent effect method of analysis. The program may also

be modified for evaluating drug and toxicity studies and for extended (life span) studies on both experimental (treated) and normal (untreated) animals. The terms protection ratio and protection value are defined. A new standardization procedure to allow comparison of results from different experiments is outlined and designated survival ratio. Four appendices give the list of the program, flow diagrams for the program and the sub-program, preparation of the data deck, and an output from a single experiment.

Author (NSA)

N66-21982# Notre Dame Univ., Ind. Dept. of Biology.

[RADIOBIOLOGY STUDIES] Progress Report, 1964-1965

Raphael Wilson, Mary Breudan Pierson, M. Dominique Crump, and Harold E. Esch 1965 158 p refs

(Contract AT(11-1)-205)

(COO-205-55) CFSTI: HC \$5.00/MF \$1.00

Gamma irradiation of rat and frog muscle preparations under mechanical stimulation produced alternations in contraction tension, contraction rate, and relaxation rate as a function of gamma dose. Release of acetylcholine from the presynaptic nerve endings or the permeability of the muscle end plates were responsible for the observed tonus changes. The electric potential of frog muscle membranes was also altered by alpha irradiation, even in the presence of nitrate, thiocyanate, iodide, bromide, and the radioprotective compound AET. Electrical properties of the internodal cells of *Nitella flexilis*, grown in different bath solutions, were changed by gamma irradiation from 1.5 k R up to 30 k R. The different reactions of cells in different bath solutions, especially in a K-free Findley solution, indicated cell membrane permeability as the possible site of radiation action in plants.

G.G.

N66-22014# Washington State Univ., Pullman

A STUDY OF FACTORS THAT GOVERN RADIOSENSITIVITY OF PLANTS Research Report No. 15, 1 Nov. 1964-31 Oct. 1965

Robert A. Nilan and C. F. Konzak 1 Nov. 1965 13 p refs
(Contract AT(45-1)-353)

(RLO-353-4) CFSTI: HC \$1.00/MF \$0.50

Studies were made on the oxygen effect in dry (2 to 10% water content) and moist (11 to 14% water content) irradiated barley seeds and of the mutagenic action of oxygen in barley seeds of different water contents. The effects of nitric oxide and dimethyl sulfoxide on the oxygen effects were also investigated. The results suggest that in dry seeds oxygen availability is a limiting factor in reaching maximum damage, presumably induced through oxygen-radical interaction, and that possibly oxygen-radical interactions do occur even in moist seeds when oxygen is available. It was also found that oxygen may be more effective in moist seeds at a lower than a higher pH.

NSA

N66-22052# Massachusetts General Hospital, Boston. John Collins Warren Labs.

AN INVESTIGATION ON THE MECHANISMS AND REGULATIONS OF NUCLEIC ACID AND PROTEIN SYNTHESIS, AND THEIR POSSIBLE RELATIONSHIP TO RADIATION DAMAGE Progress Report, 1 Sept. 1964-31 Aug. 1965

Paul C. Zamecnik and Joseph W. Gardella [1965] 45 p refs
(Contract AT(30-1)-2643)

(TID-21973) CFSTI: HC \$2.00/MF \$0.50

The various steps involved in the biosynthesis of proteins are reviewed and several aspects of the normal biosynthetic pathways are elucidated. Emphasis was placed on the relationship of the secondary structure of the transfer RNA molecule to its recognition by the enzyme involved in its acceptance of

its specific amino acid. Two approaches were used: the alteration of specific bases in the transfer RNA molecule by, for example, ultraviolet irradiation; and the chemical alteration of the amino acid side chains of the enzyme, the aminoacyl-synthetase. In addition, to normal processes of growth were sufficiently delineated to make feasible investigations on the details of the regulation of protein and nucleic acid synthesis following infection by oncogenic viruses and during the process of liver regeneration. Data are included from studies on the secondary structure of s-RNA, using optical rotary dispersion; the effect of ultraviolet radiation on the formation of aminoacyl-s-RNA; the chemical modification of s-RNA; the effects of oncogenic viruses on protein and nucleic acid synthesis; and studies on growth regulation in whole cell systems. A list is included of 23 publications during the period covered by this report.

NSA

N66-22084# California Univ., Berkeley. Lawrence Radiation Lab

DISPERSION OF OPTICAL ROTATION AND BIREFRINGENCE OF BIOPOLYMERS. I: THEORY OF FARADAY ROTATION IN POLYMERS. II: ELECTRICAL BIREFRINGENCE OF TOBACCO MOSAIC VIRUS. III: OPTICAL ROTATION OF DINUCLEOSIDE PHOSPHATES

C. Allen Bush (Ph.D. Thesis) Jul. 1965 210 p refs (Contract W-7405-ENG-48)

(UCRL-16278) CFSTI: HC \$6.00/MF \$1.25

The optical properties of biological polymers in the ultraviolet and the interpretation of results to give information on the structure of biopolymers in solution are discussed. The theory of Faraday effect in organic molecules is developed and Faraday rotational strengths are defined. An exciton theory of the interaction of groups in a polymer is applied to Faraday rotation. This theory is used to predict how the Faraday effect changes with polymer conformation. Experiments on the optical properties of tobacco mosaic virus (TMV) and TMV protein are described. The optical rotatory dispersion (ORD) of TMV, of TMV protein subunits, and of TMV protein in aggregated rods is reported and discussed in terms of absorbing groups. The electrical birefringence of TMV and TMV protein rods is determined as a function of wavelength of light in an attempt to determine the orientation of the absorbing groups. A calculation is included of the ORD of dinucleoside phosphates from an exciton model. The method assumes that the circular dichroism has the same dependence on wavelength as does the absorption. The ORD is obtained from a Kronig-Kramers transformation of the circular dichroism. The results of the Faraday rotation theory are applied to the effect observed in ketones. The interpretation leads to the conclusion that the 280 m μ absorption is composed of two distinct electronic transitions. In polymers, the theory predicts a structure-dependent Faraday effect. The ORD of TMV and its protein is interpreted as implying that the rods of aggregated protein resemble the native virus. The interpretation of the birefringence of TMV and the aggregated protein as a function of wavelength proved to be ambiguous. This ambiguity results partly from the small amount of RNA in the virus and partly from difficulties in separating the intrinsic birefringence from the form birefringence. The calculation of the ORD of dinucleoside phosphates gives reasonably good agreement with experiment, indicating that the exciton interaction is the origin of the large Cotton effects observed in some dinucleosides. It was also concluded that ApA and UpU are right handed helices and that, by implication, poly A at pH 7 also forms a right handed helix. The calculations suggest very strongly that all dinucleoside phosphates of the four RNA bases (A, U, G, and C) are right handed in conformation, and that they have helical

increment angles of 28 to 40°. The calculation also predicts that certain dinucleoside phosphates may have very large rotations at low temperature.

Author (NSA)

N66-22110# Columbia Univ., New York. Dept. of Physics. **SEMINAR ON TOPICS IN BIOPHYSICS Final Report**

Roderick K. Clayton et al (C. F. Kettering Res. Lab.) [1964] 37 p refs Seminar held 29 Jun.-17 Jul. 1964 (Contract AT(30-1)-3424)

(NYO-3424-1) CFSTI: HC \$2.00/MF \$0.50

A program of informal lectures, discussions, and demonstrations was presented. Topics discussed included: the biochemical and physical aspects of photosynthesis; a conceptual system of molecular genetics with emphasis on the role of nucleic acids in the synthesis of enzymes from nucleic acids; the photochemistry and photobiology of nucleic acids in microorganisms; the properties, structure, and function of bacterial, plant, and animal viruses; the storage, replication, and transfer of genetic information in macromolecules with emphasis on the role of DNA and RNA in protein synthesis; physical mechanisms related to excitable cell membranes; physical aspects of biological movements, with emphasis on muscle physiology; physical studies of nucleic acids in solutions; nonchromosomal heredity, with emphasis on studies of the properties of nonchromosomal genes and mutations of a non-chromosomal genetic system in a single-celled algae, *Chlomydomonas*; and the structures of nucleic acids, their physical properties, how the structures may be determined by physical methods, and the relation of physical properties to biological properties.

NSA

N66-22171*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

SOME OBSERVATIONS ON SECONDARY ASCENDING AFFERENT SYSTEMS IN THE CENTRAL NERVOUS SYSTEM

William R. Mehler [1964] 38 p refs Submitted for Publication

(NASA-TM-X-56069) CFSTI: HC \$2.00/MF \$0.50 CSCL 05P

Recent experimental data related to the classical notion that the principal ventral posterior lateral and medial thalamic nuclei represent significant neural relays in the central pain pathway are discussed. Emphasis was placed on the phylogenetic constancy of the terminal patterns of ascending spinal projections found in mammals ranging from the marsupial to man. Experimental data on the course and distribution of afferent projections to the mesencephalon, the distribution of somesthetic afferent fibers in the posterior thalamus, and the intralaminar afferents and connections of the nucleus centrum medianum were considered. It was concluded that experimental data argues against the hypothesis that the nucleus centrum medianum, or the central lateral, para-, and intralaminar nuclei represent the neural relays. It was further concluded that central pain pathway mechanisms might be represented by neural structures lying in the posterior thalamus or in the region of the meso-diencephalic transition.

N.E.N.

N66-22173*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PRIMORDIAL ORGANIC CHEMISTRY AND THE ORIGIN OF LIFE

Cyril Ponnamperna [1964] 15 p refs Presented at the 3d Intern. Symp. on Bioastronautics and the Exploration of Space, San Antonio, 16-18 Nov. 1964

(NASA-TM-X-54951) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

The synthesis of the constituents of the nucleic acid molecule and the protein molecule is reviewed. The primitive earth

conditions were simulated, with respect to atmospheric composition and energies available for organic compound synthesis. Experiments are described exposing methane, ammonia, and water to ultraviolet ionizing radiation, electric discharges, and heat. Hydrogen cyanide and formaldehyde were found as products. When these two products were further exposed to ultraviolet radiation, a wide variety of organic compounds were formed—adenine, guanine, urea, ribose, deoxyribose, and nucleoside deoxyadenosine. Dipeptides were formed by exposing an aqueous solution of glycine and leucine to uv radiation. It was concluded that molecules of biological significance can be synthesized. The results were considered to support the hypothesis of chemical evolution.

N.E.N.

N66-22176# Bryn Mawr Coll., Pa. Dept. of Biology.
THE EFFECT OF ENVIRONMENTAL TEMPERATURE ON LETHALITY OF ENDOTOXIN AND ITS EFFECT ON BODY TEMPERATURE IN MICE Final Report
 L. Joe Berry Jul. 1965 33 p refs
 (Contract AF 41(609)-1764)
 (AD-619535) CFSTI: HC \$2.00/MF \$0.50

Acute exposure of mice to an environmental temperature of either 5°C or 37°C reduced the LD₅₀ of a crude *Serratia marcescens* endotoxin from a high of 2300 micrograms in mice housed at 30°C to an amount less than 40 micrograms. At 15°C or 32°C, the LD₅₀ was, respectively, 880 micrograms and 550 micrograms, while at 25°C it was 1200 micrograms. Control animals placed at each of these temperatures were able to maintain normothermia except for those at the high and low extremes where they became slightly hyperthermic and hypothermic. Following an injection of either twice the LD₅₀ or a dose of 1000 micrograms, the thermo-regulatory ability was upset at all temperatures except 30°C. Mice at temperatures below 30°C became progressively more hypothermic as the environment was increasingly cold and vice versa at higher temperatures. It is believed that endotoxin sensitizes mice to heat and cold rather than these temperatures, sensitizing to endotoxin. After one week of acclimatization at 5°C or 37°C, the LD₅₀ of endotoxin increased, respectively, to 790 micrograms and 260 micrograms. Inducibility of the liver enzyme tryptophan pyrrolase, believed to play a role in an animal's response to endotoxin, was evaluated at each environmental temperature. Only at the extremes was it suppressed.

Author (TAB)

N66-22194*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FACTORS AFFECTING FATTY ACID SYNTHESIS IN CELL-FREE PREPARATIONS FROM *SACCHAROMYCES CEREVISIAE*

David White and Harold P. Klein [1964] 11 p refs Submitted for Publication
 (NASA-TM-X-56530) CFSTI: HC \$1.00/MF \$0.50 CSCL 06M

Experiments were conducted to determine whether yeast preparations are subject to controlling influences by certain intermediates of the oxidative and fermentative metabolism of glucose. Long-chain fatty acid synthesis was demonstrated in high speed supernats from yeast. Citrate, glucose-6-phosphate, fructose-1,6-diphosphate, and L- α -glycerophosphate were found to stimulate fatty acid synthesis. The site of stimulation appeared to be the carboxylation of acetyl-CoA. It is reported that palmityl-CoA inhibited both fatty acid and nonsaponifiable lipid synthesis, however, L- α -glycerophosphate failed to reverse the inhibition, suggesting that glycerophosphate stimulation of fatty acid synthesis is not a merely a reversal of acyl-CoA inhibition. The experimental processes are discussed and the data obtained are given. H.S.W.

N66-22195*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

METHODS OF CONFUSION IN A PATTERN MATCHING TASK

James A. Duke [1965] 14 p refs Presented at the 45th Ann. Meeting of Western Psychological Assoc., Honolulu, Hawaii, 14-19 Jun. 1965
 (NASA-TM-X-56674) CFSTI: HC \$1.00/MF \$0.50 CSCL 05H

Human response to various changes in patterns was examined. The methods used to induce pattern degradation are discussed and the experimental procedures that were used are explained. The differences in response choices given by male and female subjects is noted and the data obtained is tabulated. It was concluded that different types of degradation influence response choices and these choices are also influenced by the amount or level of degradation. It is reported that while the analysis failed to show consistent sex differences across all the combinations of degradations investigated, it did show that in half the cases there was an interaction between the level of degradation and the sex factor. H.S.W.

N66-22198*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

MANUAL CONTROL FOR THE MORL

Ralph W. Will [1964] 21 p refs Presented at the SAE-18 Comm. Meeting, New York, 8-10 Jul. 1964
 (NASA-TM-X-56445) CFSTI: HC \$1.00/MF \$0.50 CSCL 05H

Mission objectives and control system functions for the Manned Orbital Research Laboratory are outlined and a manual control concept for these functions is discussed. Laboratory operations console layouts and experimental program requirements are used to develop procedures for the manual control tasks. Evaluation of man's capability in controlling the laboratory motions under typical mission and emergency conditions has been made using the flight control simulator, and these data are compared with automatic system performance. The simulator results are then used to optimize the control system characteristics for the manual control mode.

Author

N66-22216*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EARLY EFFECTS OF CORTICOSTERONE ON AMINO ACID INCORPORATION BY RAT LIVER SYSTEMS SUBSEQUENT TO ITS *IN VIVO* INJECTION

Henry A. Leon [1965] 18 p refs Submitted for Publication
 (NASA-TM-X-56676) CFSTI: HC \$1.00/MF \$0.50 CSCL 06C

Fasted male rats were given single intraperitoneal injections of corticosterone or of saline. Amino acid incorporation into liver microsomal and cell-sap protein was subsequently assayed using cell-free systems. Endogenous pyruvate kinase and added phospho-enol pyruvate were used to maintain nucleotide triphosphate levels necessary for prolonged incorporation. Doses of 25 or 50 μ g/Kg were effective in stimulating incorporation. The latter dose significantly stimulated microsomal incorporation 20% at 15 min and 118% at 30 min. Stimulation with a wider range of doses was also seen in adreno-demedullated rats, thus largely excluding epinephrine as a factor. When intact rats were injected with stimulatory doses and subsequently tested in an incorporation system utilizing added creatine kinase and creatine phosphate for energy regeneration, no consistent stimulation of incorporation at 15 or 30 min was observable. The results suggest a rapid effect of corticosterone on endogenous liver pyruvate kinase activity.

Author

N66-22220* # National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

HUMAN TRANSFER FUNCTIONS FOR MULTI-AXIS AND MULTI-LOOP PROBLEMS

James J. Adams [1965] 12 p refs Presented at the AIAA 4th Manned Space Flight Meeting, St. Louis, 11-13 Oct. 1965

(NASA-TM-X-56684) CFSTI: HC \$1.00/MF \$0.50 CSCL 05H

Transfer function data on multi-axis pilot response are presented. The data illustrates an upper limit on response that is considered to be a limit on the pilots information processing capacity. Application of the transfer function data to a multi-loop command maneuver is also presented. The measurements were made by matching an analog model (constructed with analog computing equipment) to the pilot by automatically adjusting three gains in the model. An example of the ability of the parameter-tracking method to identify a known system; and a sample time history of the roll response of subjects in a three-axis test are graphically depicted. The curves illustrate the match that is achieved between human and model; and illustrate the time variation in the measured model gains that is typically encountered in multi-axis tests. To show the distinction between a multi-axis and multi-loop problem, block diagrams of the two types of systems are shown. In addition the time histories of a human controlled response to a 1000 ft translation command and the response obtained using the analog models for the pilot are shown. L.S.

N66-22246# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EFFECTS OF HYPOHYDRATION ON WORK PERFORMANCE AND TOLERANCE TO $+G_z$ ACCELERATION IN MAN
J. E. Greenleaf, M. Matter, Jr., J. S. Bosco (San Jose State Coll.), L. G. Douglas, and E. G. Averkin [1965] 26 p refs Presented at the Aerospace Med. Conv., New York, 26-29 Apr. 1965

(NASA-TM-X-56368) CFSTI: HC \$2.00/MF \$0.50 CSCL 06S

Nine men were water depleted up to 6.9% of their body weight during controlled 5-day dietary periods and then subjected to various physical performance tests, including grayout tolerance while undergoing $+G_z$ -3.0 G/min. acceleration, to define set points (the % hypohydration where functional deterioration begins). Hypohydration refers to the primary water-loss type of dehydration. The following set points were observed: total body reaction time—0 to 1%; isometric muscular strength—greater than 4%; Harvard step test—4 to 4.5%; sub-maximal O_2 intake—greater than 4%; and $+G_z$ -3.0 G/min. centrifugation—greater than 4%. The concept of free circulating water was suggested as a possible explanation for the diversity of results regarding the effects of water depletion on bodily deterioration and work performance. Author

N66-22247* # California Univ., Berkeley. Space Sciences Lab.

SPACE PHYSIOLOGY Final Report

12 Nov. 1964 28 p refs /ts Ser. No. 5, Issue No. 67

(Contract NAS2-1357; Grant NSG-139-61)

(NASA-CR-59790) CFSTI: HC \$2.00/MF \$0.50 CSCL 06S

Instrumentation for sensing and telemetering physiological information from unrestrained animals has been developed. Parameters which were monitored include blood pressure, temperature, acceleration, respiration, and the electrical signals associated with heart beat and brain activity. Sensor-transmitter units were chronically implanted in rabbits, dogs, and monkeys. Implantation methods and implant effects on animals were studied. Initial work was done on a blood oxygen tension transducer to be implanted in a vessel or in the heart. Emphasis has been on blood pressure measurements through

the intact artery wall. Studies on rabbits and dogs indicate that an artery will tolerate application of a transducer and its holder. Problems of drift, moisture penetration, and temperature sensitivity are being eliminated and pressure sensitivity is being increased. A modified blood pressure transducer-transmitter was used as a respiration monitor. In electrocardiogram and electrocorticogram units, electric signals are picked up, amplified, and used to modulate a transmitter. They can transmit continually for two years. A temperature transducer was also designed to transmit for two years. R.N.A.

N66-22248* # National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

QUANTITATIVE MEASUREMENT BY TELEMETRY OF OVULATION AND OVIPOSITION IN THE FOWL

C. M. Winget, E. G. Averkin, and T. B. Fryer 10 Nov. 1964 27 p refs

(NASA-TM-X-54841) CFSTI: HC \$2.00/MF \$0.50 CSCL 06C

A radio telemetry system was used to establish a body temperature cycle in the domestic fowl. Certain sex differences were noted. In the female, the maximum body temperature was reached at time of oviposition. The female has a 28-hr cycle and the male a 24-hr cycle. The data were evaluated by autocovariance, power spectral analysis, harmonic regression, and other methods. Author

N66-22265* # National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

EFFECTS OF ADRENALIN OR INSULIN ON THE PERFORMANCE OF WORKING AND RESTING SUBJECTS

Clayton R. Coler, William A. Mc Laurin, and Donald R. Young [1965] 22 p refs Presented at the Aerospace Med. Conv., New York, 26-29 Apr. 1965

(NASA-TM-X-56371) CFSTI: HC \$1.00/MF \$0.50 CSCL 06S

The performance and physiological effects of adrenalin or insulin were studied in human subjects. After approximately eight hours of enforced work or rest, one group of nine subjects received insulin, and another group of nine subjects received adrenalin. The subjects in each drug group participated in both a working condition and a resting condition on separate occasions. Short-term memory, choice reaction time and steadiness tests were used to evaluate subject performance. Ten preinjection and seven post-injection sessions of performance testing were given. Postinjection performance decrements occurred on all three tests for all subjects, both working and resting, in the insulin group. Fewer decrements occurred in the adrenalin group. For the insulin group, postinjection decrements were most frequent in the working condition. However, for the adrenalin group, postinjection decrements were most frequent in the resting condition. Performance in the working condition of the insulin group had not recovered to preinjection levels three hours after injection, while recovery had occurred in all other conditions. Author

N66-22269* # General Electric Co., Philadelphia, Pa. Missile and Space Div.

NASA/LANGLEY 55' VACUUM CYLINDER MAN RATING Final Design Report

[1965] 316 p refs

(Contract NAS1-5311)

(NASA-CR-66076) CFSTI: HC \$7.00/MF \$1.75 CSCL 05E

A 55' vacuum cylinder is described for use as a man rated chamber such that men equipped with pressurized suits can be assigned to perform tasks within the chamber representative

of those required for servicing and repair of spacecraft in orbit and on extraterrestrial surfaces, for exploration on these surfaces utilizing self and vehicle locomotion, and for establishment of shelters and bases needed for protection and research. The designs presented here have been performed in accordance with the requirements. The necessary services and equipment can be divided conveniently into seven major categories or systems exclusive of the repressurization and man-lock systems which are considered a part of the vacuum cylinder per se and thus not considered in design detail as part of this program. The seven systems, their respective design considerations, and procurement specifications, are discussed separately.

Author

N66-22272*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

HUMAN TRANSFER FUNCTIONS IN MULTI-AXIS AND MULTI-LOOP CONTROL SYSTEMS

James J. Adams, Hugh P. Bergeron, and George J. Hurt, Jr. Washington, NASA, Apr. 1966 46 p refs

(NASA-TN-D-3305) CFSTI: HC \$0.65/MF \$0.50 CSCL 05H

Measurements were made of the response of a human pilot in multi-axis tracking tasks. These measurements are the gains in the transfer function of the pilot and the performance measure, root-mean-square error. The measured transfer functions were used to obtain analytically the closed-loop system characteristics. The results show that the pilot changes the response so that the system frequency is reduced as additional axes requiring control are added to the work load. It is shown that these results can be correlated with a theory that the pilot has a given maximum information processing capacity. These measured multi-axis response characteristics were used to obtain a quantitative description of the characteristics of a multi-loop manually controlled guidance system. The time history of the manually controlled system can be reproduced by using two linear analog models, one for each loop, arranged in series, to represent the pilot. Measurements made in the multi-axis test can be applied to the inner loop, and the same form of the model with modified gains can be used in the outer loop.

Author

N66-22279*# Melpar, Inc., Falls Church, Va.

RESEARCH AND DEVELOPMENT OF AN INSTRUMENT FOR DETECTION OF EXTRATERRESTRIAL LIFE BY OPTICAL ROTATORY DISPERSION Final Technical Report

Washington, NASA, Apr. 1966 99 p refs

(Contract NASw-842)

(NASA-CR-423) CFSTI: HC \$1.45/MF \$0.75 CSCL 06B

A novel single-beam polarimeter capable of development to meet the requirements of a space mission to seek optical activity in extraterrestrial soil samples is described. Optical rotatory dispersion curves of extracts of soil and ancient strata were obtained with this instrument. The polarimeter is relatively insensitive to scattering, dichroism and absorption. It can make measurements of optical rotation in the presence of optical densities of approximately 5, provided the light source has sufficient spectral purity. It is concluded that the feasibility of producing an experiment to seek for optical activity in an extraterrestrial soil sample has been demonstrated.

Author

N66-22280*# National Aeronautics and Space Administration, Washington, D. C.

ON THE CHANGES IN THE CHLORIDE LEVELS IN THE BLOOD, URINE, AND SWEAT ASSOCIATED WITH MUSCULAR ACTIVITY [ÜBER DIE SCHWANKUNGEN DES CHLORIDGehALTES IM BLUT, HARN UND SCHWEISS BEI MUSKELTÄTIGKEIT]

A. F. Koriakina, E. B. Kossowskaja, and A. W. Krestownikoff Jan. 1966 24 p refs Transl. into ENGLISH from Arbeitsphysiologie (Berlin), v. 2, 1930 p 461-473 Presented at 127th Meeting of the Russian Physiol. Soc., 31 Oct. 1929 (NASA-TT-F-9736) CFSTI: HC \$1.00/MF \$0.50 CSCL 06S

Studies were conducted on the chloride levels in the blood, urine and sweat of individuals after various degrees and types of muscular activity. Two levels of blood chloride were discernible: it rose shortly before the start or after the cessation of a short period of work, and dropped after a longer period of exertion. The urine chloride level generally dropped, however the amount of chloride in the urine usually increases at the start of the activity. The magnitude of the drop in blood and urine chlorides stands in a direct relation to the intensity and duration of exertion. Muscular activity as a rule caused the sweat chlorides to rise. When the blood chloride level was low, no chlorides were eliminated via sweat. Finally, chloride metabolism during muscular activity was related to the general water and salt metabolism. One thing that does appear certain is that the release of chlorides through perspiration requires a certain blood chloride level, and this minimum level varies greatly.

Author

N66-22284*# National Aeronautics and Space Administration, Washington, D. C.

MANEUVERING IN FREE SPACE [V BEZOPORNOM PROSTRANSTVE]

V. Stephantsov, A. Yerevin, and S. Alekperov Jan. 1966

18 p refs Transl. into ENGLISH from Aviats. i Kosmonavt (Moscow), v. 47, no. 7, 1965 p 48-53

(NASA-TT-F-9883) CFSTI: HC \$1.00/MF \$0.50 CSCL 05E

Consideration of methods of orienting the human body under conditions of weightlessness in the absence of a support. Various techniques for making the body rotate by moving the arms and legs are described. It is shown that the most favorable methods of rotating the body are those initiated by movements of the legs. A rotation where the legs are spread apart in a scissors-like fashion in the front-to-back direction is singled out for particular attention and is recommended as the main method to be used in orienting the body about its longitudinal axis.

Author

N66-22300*# National Aeronautics and Space Administration, Washington, D. C.

VISUAL OBSERVATION OF INFRARED LASER EMISSION [O VIZUAL'NOM NABLYUDENII INFRAKRASNOGO IZLUCHENIYA OPTICHESKOGO KVANTOVOGO GENERATORA]

L. S. Vasilenko, V. P. Chebotayev, and Yu. V. Troitskiy Feb. 1966 8 p ref Transl. into ENGLISH from Zh. Eksperim. Teor. Fiz. (Moscow), v. 48, Mar. 1965 p 777-778

(NASA-TT-F-9888) CFSTI: HC \$1.00/MF \$0.50 CSCL 06D

Description of experiments in visual perception of intense coherent infrared radiation. Radiation of 0.95, 1.11, 1.15 and 1.18 μ from a gas laser was observed with the unaided eye. Radiation with $\lambda=0.95 \mu$ is perceived as red light, while radiation with $\lambda=1.11, 1.15$ and 1.18μ is perceived as light with half the wavelength of red light.

Author

N66-22360*# California Univ., Berkeley

CHRONIC ACCELERATION STUDIES: PHYSIOLOGICAL RESPONSES TO ARTIFICIAL ALTERATIONS IN WEIGHT Final Technical Report, 1962-1965

C. F. Kelly and A. H. Smith Washington, NASA, Apr. 1966 10 p refs Prepared for ONR

(NASA Order R-53)

(NASA-CR-441) CFSTI: HC \$0.10 MF \$0.50 CSCL 06S

Centrifuge tests were conducted in order to determine the pathological and physiological responses of an organism to chronic acceleration, i.e., prolonged exposure to force fields greater than the gravity of the earth. Chickens were gradually introduced to a force of 3G and were kept at this level for periods up to several months. The following results are reported. The exposure of animals to chronic acceleration may result in a substantial mortality rate up to 30% for three months. Survival in hyperdynamic environments requires physiological adaptation. Physiological adaptation to hyperdynamic environments may be retained for long periods of time. The factors which permit animals to tolerate hyperdynamic environments are heritable. Based on these and other results, it is concluded that: (1) organisms can physiologically adapt themselves to chronic acceleration, up to some limiting intensity which is inversely related to body size; and (2) the physiological and anatomical changes appear to be proportional to the accelerative force. D.T.

N66-22366* # National Aeronautics and Space Administration, Washington, D. C.

NASA ASTRONAUTS

[1966] 31 p

(NASA-EP-34) GPO HC \$0.20; CFSTI: MF \$0.50 CSCL 05J

This illustrated brochure describes the qualifications and training of NASA astronauts. A brief biography of thirty three of the active astronauts is also included. H.S.W.

N66-22372* # Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

A TIME CONSTANT INVOLVED IN ATTENTION AND NEUTRAL INFORMATION PROCESSING

Alfred B. Kristofferson Washington, NASA, Apr. 1966 45 p refs

(Contract NAS2-2486)

(NASA-CR-427) CFSTI: HC \$0.70/MF \$0.50 CSCL 05J

Three behavioral time parameters are defined and experiments have been done which allow them to be estimated independently for single individuals. The three parameters are equal in magnitude, about 50 msec., for the group of subjects. They are highly correlated over individuals. They are independent of sensory modality. And they vary over individuals in the same way and to the same extent in relation to another variable. It is concluded that they are identical. Further, a simple theory provides an integrated interpretation of the three. In one small experiment it is shown that the behavioral cycle time is approximately equal to the interval between zero-crossings of the alpha rhythm of the electroencephalogram and that there are significant correlations over individuals between this neurophysiological quantity and the behavioral parameters. Author

N66-22377* # Schwarz BioResearch, Inc., Orangeburg, N. Y. **SUPERIOR DIET FOR MAN IN SPACE Annual Report, Oct. 1964-Oct. 1965**

Norman A. Rosenthal Apr. 1966 220 p refs

(Contract NASw-517)

(NASA-CR-71817) CFSTI: HC \$6.00/MF \$1.25 CSCL 06H

Experiments using rats were conducted to study the stability of liquid diet solutions. The phenomenon of browning was considered and it was determined that a loss of biological activity and the development of a toxic character in the diet solution are accompanied by the appearance of browning. Studies further revealed that this phenomenon can be arrested and a mechanism for this reaction is given. Rats were given diet solutions that were exposed to radiation and, at high

radiation levels, only a slight loss in biological activity was observed; however, a marked loss in biological activity occurs when the solutions are stored at room of higher temperatures. Liquid chemical diets were prepared using acid protein hydrolysates and were reported to be comparable to diets prepared from pure individual amino acids. It was determined that a 30% weight volume ratio liquid diet solution is sufficient to satisfy the nutritive requirements of a growing rat. A method, using deuterium oxide, was also discussed for determining the interrelationships of dietary water to drinking water. H.S.W.

N66-22395* Information Research Associates, Inc., Cambridge, Mass.

A SCHEME FOR LINEAR RECOGNITION BASED ON SELF-DETERMINED INTER-CATEGORY FEATURES Technical Note No. 1

Joel Owen 15 Jul. 1965 12 p refs

(Contract Nonr-4752(00))

(IRA-100 AD-678708) CFSTI: HC \$1.00/MF \$0.50

In a pattern recognition problem, where observations are described by a $m \times n$ grid, it is often the case that each pattern is reduced to a mask and discrimination is performed by comparing an unknown to each mask. Assignment is then determined by the closest mask. This paper discusses a pre-processing technique for feature extraction to reduce the size of the masks or to extract those mask sub-areas most pertinent for recognition. Statistical tests are applied to determine uncommon regions (i.e., differences) between masks. All subsequent recognition is based on and emphasizes these uncommon regions (as distinguishing features). The resulting weights of this method are controlled by differences between the groups and thus cannot be separated into a characteristic set of weights for each individual group. Moreover, this method provides the freedom to elect the level of closeness that the categories must satisfy. Author (TAB)

N66-22403* Naval Radiological Defense Lab., San Francisco, Calif.

RECOVERY FROM RADIATION INJURY IN DOGS AS EVALUATED BY THE SPLIT-DOSE TECHNIQUE

E. John Ainsworth and George F. Leong 30 Dec. 1965 28 p refs

(USNRDL-TR-964; AD-628791) CFSTI: HC \$2.00/MF \$0.50

The split-dose technique was used to evaluate recovery from radiation injury in dogs given an initial conditioning exposure to 217 R, which is approximately 2/3 of the LD₅₀. Based on LD₅₀'s determined at 1, 3, 7, 14, and 20 days after the conditioning exposure, recovery is rapid with 50% recovery occurring by about 3 days. Because of relatively large 95% confidence intervals, the recovery rate per se is difficult to establish. An exponential curve with a recovery half-time of 3.1 days may be an acceptable fit to the data. However, between 3 and 20 days the animals' radiosensitivity appeared to change linearly at a rate of approximately 8.5 R/day. At 20 days approximately 40 R of radioresistance was detected, but this was not statistically significant. The numbers of circulating leucocytes were followed for several months after exposure to 150 R or 217 R. The leucocyte counts return to only 70-80% of the pre-irradiation values by approximately 4 months. The data are discussed in terms of the proposed correlation between recovery from radiation injury and basal metabolic rate or changes in the number of circulating leukocytes. Author (TAB)

N66-22408# Information Research Associates, Inc., Cambridge, Mass.

TWO CLASSES OF NON-PARAMETRIC TECHNIQUES FOR PATTERN RECOGNITION AND THEIR ERROR ANALYSIS

Joel Owen 1 Sep. 1965 23 p refs reissued
(Contract Nonr-4752(00))
(IRA-TN-2; APL-472; AD-628709) CFSTI: HC \$1.00/MF \$0.50

Another criterion is added to handle the case when distributional information is lacking. This criterion is to approximate the Bayes solution based only on the statistics acquired during the learning phase. This criterion approaches the optimum risk decision as the learning phase is increased. Two classes of nonparametric techniques are proposed. Corresponding error analyses for these two techniques are made in order to determine how much is lost by using sub-optimal (i.e., a finite learning phase) decisions. Author (TAB)

N66-22437# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ON THE PROBLEM OF HYPNOPEDIA

N. D. Zavalova, V. P. Zukhar, and Yu. A. Petrov 22 Sep. 1965 12 p refs Transl. into ENGLISH from Vopr. Psikhologii (Moscow), no. 2, 1964 p 98-102
(FTD-TT-65-783/1+4; AD-622456) CFSTI: HC \$1.00/MF \$0.50

Conclusions: The possibility of acquiring knowledge at the time of natural sleep does exist. With respect to persons with higher suggestibility, in the state of being awake, an adjustment can be created for perception of information (the formation of a peculiar 'watchful point' in the sleepers). Hypnopedia may find broad application in various branches of knowledge: when studying languages, and in the adoption of formulas, ciphers, codes, and other types of information. TAB

N66-22438# Southwest Research Inst., San Antonio, Tex. Dept. of Structural Research.

SUMMARY OF COST AND TIME REQUIRED FOR MODIFICATIONS AND CONVERSIONS ON THE USAF SCHOOL OF AEROSPACE MEDICINE HUMAN CENTRIFUGE AND ROTATIONAL FLIGHT SIMULATOR, PHASE III Final Report

A. J. Pryor, L. A. Eggleston, and R. K. Johnston 10 Dec. 1965 16 p
(Contract AF 41(609)-2715)
(AD-627430) CFSTI: HC \$1.00/MF \$0.50

A study was made of the fire hazards peculiar to the equipment and operation of the USAF School of Aerospace Medicine Human Centrifuge and Rotational Flight simulator at Brooks Air Force Base, Texas. The study was based on present Air Force standards and recommendations were outlined in previous reports where hazards exceeded acceptable limits. The report contains cost and time estimates for the accomplishment of the recommendations referred to above.

Author (TAB)

N66-22440# Parma Univ. (Italy). Inst. of Human Physiology. **PHYSIOLOGY OF CENTRAL VISUAL PATHWAYS Final Report, 1 Jan.-31 Dec. 1965**

A. Arduini 20 Jan. 1966 55 p refs
(Grant AF-EOAR-65-8)
(IHP-65-2; AFOSR-66-0176; AD-628081) CFSTI: HC \$3.00/MF \$0.50

The transfer functions of lateral geniculate nucleus and of visual cortex I have been determined under conditions of

steady state flickering illumination at fixed intensity. The results are compared with those of steady non-flickering stimulation. Microelectrode recordings under conditions of steady illumination with non-flickering light of different intensities have been made from individual fibers in the geniculo-cortical and in the corticothalamic tracts. An analysis of mean discharge frequency and of interspike interval distribution has been performed. Author (TAB)

N66-22443# Farr Cytochemical Labs., Camden, Maine. **RESEARCH ON CELL WALL CYTOCHEMISTRY OF SELECTED FUNGI Final Report, Mar. 15, 1964-Mar. 10, 1965** Wanda K. Farr Wright-Patterson AFB, Ohio. AMRL, Oct. 1965 91 p refs

(Contract AF 33(615)-1544)
(AMRL-TR-65-151; AD-628045) CFSTI: HC \$3.00/MF \$0.75

Cytochemical analyses of the four imperfect fungi, *Cylindrocephalum* sp., *Curvularia lunata*, *Aspergillus oryzae*, and *Gliocladium deliquescens* showed that the resistant material in their cell walls is chitin. All efforts to identify cellulose produced negative results. Solutions of chitinase-containing Worthington Lysozyme (Muramidase) in concentrations of 0.5 mg./ml. brought about dissolution of the cell walls and dispersion of the cell contents. Enzymatic hydrolysis represents the most suitable method now available for the conversion of fungal cell wall chitin to digestible end products with the simultaneous release of nutrient substances in the protoplasm. Specific studies have continued on protoplasmic phenomena within the cells of fungi examined, especially *Heterocephalum aurantiacum* plastid-like structures in the protoplasts are the cell organs which produce chitin. Chitin-forming plastids increase in number by direct division and the quantities of chitin at their surfaces, in a given cell, may be equal to or greater than the amount of chitin in the cell wall. This information necessitates the inclusion of chitin located in the protoplasts, as well as that in the cell walls, in any considerations of fungal tissues as food for astronauts in extended explorations of space. Author (TAB)

N66-22473# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio. **EFFECTS OF VARIOUS GASES ON HANDGEAR INSULATION Final Report, Sep. 1964-Mar. 1965**

John F. Hall, Jr., Willi J. Buehring, and Wolfgang W. Strobl (Dayton Univ.) Dec. 1965 18 p refs
(AMRL-TR-65-4; AD-628367) CFSTI: HC \$1.60/MF \$0.50

The effect of gases having different thermal conductivities on the thermal insulation of handgear was investigated. Experimental mittens with special plastic spacer interliners of various thicknesses were sealed between gas impermeable outer and inner shells and filled first with room air (as control), then various experimental gases, and thermal insulation measured on a copper hand. Experimental gases included carbon dioxide, freon-12, and helium. Comparative results are presented in terms of percentage insulation change; clo per inch; conductivity (K) values; and the measured thermal insulation (clo) values. Before all tests each mitten was evacuated (13 cm hg) to remove all entrapped air, then filled without contamination with the control, or experimental gas. Gas within the handgear was maintained at a constant positive pressure (7.6 mm water) throughout each experiment. Mean measurements showed significant increases (13-32%) of thermal insulation for freon-12 and carbon dioxide, with decreased insulation observed with helium. Significance and some practical application of these results for protective clothing design are shown.

TAB

N66-22474# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

FEASIBILITY OF USING HANDRAILS TO MOVE ALONG A SURFACE WHILE WEIGHTLESS Final Report, Jun.-Oct. 1964

Edwin H. Sasaki Aug. 1965 12 p

(AMRL-TR-65-152; AD-628596) CFSTI: HC \$1.60/MF \$0.50

A preliminary investigation into the feasibility of using handrails as an aid to the astronaut in moving from one location to another within or outside a space vehicle was undertaken in a JC-131B zero-G airplane. Eight subjects wearing flying coveralls (one of whom also performed the tests wearing an inflated full-pressure suit) moved from one point to another aided by a single handrail or two parallel handrails. Eight conditions were investigated with the parallel handrails spaced from 6 to 36 inches apart and one with the single handrail. All subjects were successful in moving across the surface and turning around using both the single and parallel handrails. Motion picture films were taken to evaluate the body positions and ease of movement. The most common position appeared to be one in which the elbows and knees were slightly bent and the torso was nearly parallel to the surface. The parallel handrails spaced from 16 to 23 inches apart appeared to provide the greatest body stability.

Author (TAB)

N66-22479# Purdue Research Foundation, Lafayette, Ind. School of Electrical Engineering.

SPEECH ANALYSIS Final Scientific Report, Jan. 1962-Dec. 1964

George W. Hughes and John F. Hemdal 1 Jul. 1965 104 p refs

(Contract AF 19(628)-305)

(TR-EE65-9; AFCRL-65-681; AD-624555) CFSTI: HC \$4.00/MF \$0.75

The limitations of speech recognition procedures which depend solely on acoustic data are discussed. One such primary recognition scheme, based on phoneme classification by tracking the acoustic correlates of a set of distinctive features, is presented. Programmed on a digital computer, these logical operations on digitalized spectra of 17-msec samples of speech were tested on some 300 nonsense utterances from two talkers. A priori information about individual talker characteristics is incorporated into the logic (single-speaker approach). Comparison of machine performance was made with both the intent of the speaker and with the judgments of listeners. Listeners were presented with the same acoustic stimuli that were machine processed. Some perceptual tests were run on short vowel segments excised from nonsense syllables. Detailed quantitative results are presented only for vowels. They show that man and machine agree about 90% of the time on vowel judgments under these conditions of minimal contextual information. Clear feature boundaries are shown on the F1-F2 plane for the (stressed) vowel utterances. Although these boundaries are not generally valid for more than one voice, simple translations of them may suffice to obtain usable vowel separation for many talkers.

Author (TAB)

N66-22485# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

THE EFFECT OF INJECTED MONOMETHYLHYDRAZINE ON PRIMATE PERFORMANCE Final Report, 26-29 Oct. 1964

Kenneth C. Back, Herbert H. Reynolds, and Henry W. Brunson Sep. 1965 25 p refs Prepared jointly with Aeromed. Res. Lab. (AMRL-TR-65-82; AD-628048) CFSTI: HC \$1.00/MF \$0.50

Nine macaque monkeys were injected on two occasions with either 2.5 or 5.0 mg/kg of monomethylhydrazine (MMH).

Operant task performance was measured, and clinical symptoms were noted. No difference in performance resulted from the two dosage levels, but there was a greater incidence of clinical symptoms in those subjects exposed to 5.0 mg/kg. In over half the cases a performance decrement preceded clinical symptoms, but in no instance did clinical symptoms precede a performance decrement. In 3/18 cases clinical symptoms did appear without a performance decrement, but in 4/18 cases a performance decrement occurred in the absence of clinical symptoms. When initial 2.5 or 5.0 mg/kg injections are made one might predict that performance decrements will occur between 1 and 2 hours and clinical symptoms between 2 and 2.5 hours in about half the subjects. A second exposure might be expected to produce performance decrements between 1 and 2 hours and clinical symptoms between 2 and 3 hours in the majority of subjects. If a subject is influenced by MMH, clinical symptoms will likely disappear between 3 and 9 hours following injection, and performance should return to baseline level between 3 and 30 hours.

Author

N66-22494# Sylvania Electric Products, Inc., Waltham, Mass. Applied Research Lab.

A THEORETICAL MODEL FOR COLOR VISION Final Report, May 1963-Apr. 1965

George Bierman and Allan Synder Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 233 p refs

(Contract AF 33(657)-11717)

(AMRL-TR-65-193; AD-628873) CFSTI: HC \$6.00/MF \$1.25

This report covers the development of a model of color vision based on feedback control principles, which provides an explanation for the wide dynamic range, high accuracy of spectral discrimination, and invariance to changing illumination that we experience in color vision. The model is consistent with physiological and psychological evidence. Analysis is presented of waveguide modes in the retinal receptors which are assumed to be the means of spectral discrimination.

Author (TAB)

N66-22506# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

URINARY EXCRETION OF VANILMANDELIC ACID AFTER +G_x IMPACT IN HUMANS

Peter G. Hanson and Peter Foster Mar. 1966 16 p refs

(ARL-TR-66-6; AD-629198) CFSTI: HC \$1.00/MF \$0.50

Seven volunteer subjects were exposed once each to 25 +G_x impact and sham impact on the Daisy Decelerator. Urinary excretion of vanilmandelic acid (VMA) was measured during two timed periods prior to and after impact or sham impact. The results indicate that the average urinary excretion of VMA increases with exposure to both impact or sham impact. The greatest average increase was observed after true impact. It is suggested that subject anxiety attendant to both experimental conditions causes an increased liberation of catecholamines. True impact may further stimulate this adrenergic activity.

Author (TAB)

N66-22531# Texas Technological Coll., Lubbock. School of Engineering.

AN ANALYSIS OF THE CENTER OF GRAVITY OF THE ARM DURING CERTAIN SIMULATED INDUSTRIAL MOVEMENTS

Virgil Bennis Mc Elhannon, (M.S. Thesis) May 1965 125 p refs

(Contract AF 33(608)-1119)

(AD-620343) CFSTI: HC \$4.00/MF \$0.75

The purpose of the study is to investigate the center of gravity of the total arm complex during certain work movements typical of those in use in industrial tasks. The center of gravity characteristics investigated are the distance and path traveled and the nature and behavior of the velocity of the center of gravity during that travel. The results of the study can be used to further the available knowledge of applying classical mechanical laws to the human body in motion.

TAB

N66-22533# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE TEACHER AND CYBERNETICS

S. Yefimov 23 Sep. 1965 10 p Transl. into ENGLISH from Komsomolskaya Pravda (Moscow), 9 Oct. 1962 p 3 (FTD-TT-65-1152/1+4; AD-622473) CFSTI: HC \$1.00/MF \$0.50

This article investigates the use and purpose of teaching machines in education, gives examples of their effectiveness, and discusses the role of the teacher with their use and their future potential.

R.N.A.

N66-22550# Florence Univ. (Italy). Inst. of Zoology.

ASTRONOMICAL ORIENTATION OF CRUSTACEA

L. Pardi 30 Jun. 1965 8 p

(Grant AF-EOAR-64-55)

(AFOSR-65-2010; AD-627404) CFSTI: HC \$1.00/MF \$0.50

The work was undertaken to ascertain on what basis do the animals 'know' that after the equinox of September the sun begins to culminate in the South, that is, at midday its azimuth is exactly that of the Theoretical Line of Escape (TLE). Results demonstrated that a population with TLE south, in clockwise phase, compensates perfectly for the apparent clockwise motion, while in a population with TLE north, the compensation is imperfect and disturbed. It seems probable that in the populations precisely subequatorial, the affirmed and valid compensation mechanism differs according to the TLE.

Author (TAB)

N66-22571# School of Aerospace Medicine, Brooks AFB, Tex.

A HISTORICAL REVIEW OF THE BUBBLE THEORY OF THE ETIOLOGY OF DECOMPRESSION SICKNESS AS RELATED TO HIGH ALTITUDE EXPOSURE

Harold R. Anderson Dec. 1965 44 p refs /*Its Aeromed. Rev.* 10-65

(SAM-TR-65-85; AD-628751) CFSTI: HC \$2.00/MF \$0.50

There was a need for a comprehensive historical review of decompression sickness and related subjects such as the bubble theory, denitrogenation, over-compression, and pertinent terminology. A simplified classification scheme is introduced which retains the currently popular term decompression sickness to describe those symptoms which arise owing to the response of the body to reduction of pressure, in accordance with Henry's law. A new term, mechanocobaropathy, is introduced to describe any symptom or disease which arises owing to the mechanical effects on body tissues of the response of gases to Boyle's law. Highlights of the literature on decompression sickness, from 1670 to 1965, are presented.

Author (TAB)

N66-22580# Ohio State Univ., Columbus. Human Performance Center.

TEAM TRAINING RESEARCH Final Technical Report, Feb. 1964-Feb. 1965

George E. Briggs and William A. Johnston Port Washington, N. Y., Naval Training Device Center, Nov. 1965 40 p refs (Contract N61339-1327)

(NAVTRADEVCE-1327-2; AD-477963)

Two experiments were performed to study team training in a CIC-type environment. The transfer task of both experiments required the two team members to coordinate their radar-controlled air intercepts. Training task fidelity was varied in terms of input and output features of the task environment and in terms of task definition. Both input and output fidelity affected the ability to coordinate at transfer, though the deficit incurred by low output fidelity was rapidly overcome at transfer. Coordination performance at transfer tended to be directly related to the emphasis placed on coordination skills during training. The individual skill components of the transfer task were acquired with equal facility under all training conditions in both experiments.

Author (TAB)

N66-22585# San Francisco State Coll., Calif. Frederic Burke Foundation Research Center.

EFFECTS OF LOW-LEVEL SHOCK ON TERRESTRIAL ORGANISMS Annual Report, 1 Jul. 1964-1 Sep. 1965

Curtis L. Newcombe 25 Oct. 1965 109 p refs

(Contracts N228(62479)66150; N228(62479)68387)

(FBFRC-TR-1; USNRDL-TRC-3; AD-475632)

This report contains results of literature and experimental studies of the effects of shock on terrestrial and aquatic organisms. Nematode worms, earthworms, isopods, ground beetles, ants, root tips of grasses and herbs, and algae were the main organisms studied. Effects on the organisms from compression and abrasion of body surfaces include: dislocation of loosely bound cells of certain body parts, weakening of the cuticle layers of worms, abrasion of cuticular layers of a wide variety of common terrestrial insects, cytological changes in root systems, and gross changes in root meristems. Air pressures of 120-175 psi produced little injury to the cuticles of nematodes. Exposures to 32-98 psi in sand produced about 20 percent injury in the form of herniation and evisceration. The responses of a wide variety of terrestrial forms to relatively low levels of shock were successfully measured using a methylene blue dye method. It is concluded that abrasion of animal cuticles by soil particles is a promising index of shock injury.

Author (TAB)

N66-22596# Itek Corp., Palo Alto, Calif. Vidya Div.

LAMINAR FLOW REGIMES FOR RIGID-SPHERE SUSPENSIONS

Alvin H. Sacks and E. Glenn Tickner 28 Feb. 1966 79 p refs (Contract AF 49(638)-1491)

(VIDYA-213; AD-629312) CFSTI: HC \$3.00/MF \$0.75

An experimental study is made of the flow of density-matched rigid sphere suspensions in rigid cylindrical tubes at low tube Reynolds numbers (0.001 to 100). It is found that a number of distinct types of flow exist within the laminar range whose character is determined by particle concentration, ratio of particle diameter to tube diameter, and Reynolds number. These flows are consistent with those seen by other investigators and in some cases bear a strong resemblance to the flow in the living microcirculation. In particular, the phenomena of 'plasma skimming', the 'tubular pinch effect', and a random-type of unsteady 'tumbling' flow are each observed for particular combinations of the above variables. It is found that for particle concentrations between about 1 and 30 percent and ratios of particle-diameter to tube-diameter between 3/16 and 7/16, there is a dramatic change in flow regime at a

tube Reynolds number of about 10. Below that value, particle interactions produce a complex, unsteady particle motion involving significant radial excursions. Above that value, particle interactions virtually cease, nearly all particles move at a constant velocity parallel to the tube axis, and no particles remain on the vessel wall. This change in flow regime is accompanied by a sudden drop in relative viscosity to approximately that predicted by the non-interaction theory of Einstein. It is shown that the fluid suspension is in all cases Newtonian and the motion is in all cases laminar. The particle interactions associated with the above phenomenon are therefore not to be confused with turbulence. In this case, an increase in the Reynolds number is found to remove the randomness—the reverse of a transition to turbulence. The various laminar flow regimes are discussed in detail, and an attempt is made to classify these with respect to particle concentration, ratio of particle diameter to tube diameter, and Reynolds number.

Author (TAB)

N66-22603# Naval Radiological Defense Lab., San Francisco, Calif

SYSTEMIC FACTOR IN RECOVERY OF RAT KIDNEY FROM IRRADIATION: THYMIDINE- H_3 INCORPORATION STUDIES

Louis W. Wachtel, Theodore L. Phillips, (Calif. Univ., San Francisco), and Leonard J. Cole 13 Dec. 1965 25 p refs

(USNRDL-TR-945; AD-627569) CFSTI: HC \$1.00/MF \$0.50

The effect of X-irradiation on thymidine- H_3 incorporation into kidney cells (thymidine index) was measured at 4–8 hour intervals up to 96 hours in unilaterally nephrectomized female weanling rats. A sharp drop in the thymidine index occurred during the first 16 hours after the kidney only was irradiated with 1000 rad, and also after the kidney was irradiated with 125 rad or 500 rad at the same time the body received 500 rad. Irradiation of the body, but with the kidney completely shielded had no apparent inhibitory effect on kidney thymidine incorporation. The ability of the irradiated kidney to incorporate thymidine reappeared in 24 hours if the remainder of the body was not irradiated. When both the body and the kidney were irradiated, recovery of thymidine uptake depended on the amount of radiation received by each. An explanation for the above observations is offered on the basis of a postulated systemic factor, the formation or induction of which could be affected by radiation and which is essential for thymidine incorporation in the kidney.

Author (TAB)

N66-22616# Naval Air Development Center, Johnsville, Pa. Aviation Medical Acceleration Lab.

FLASHBLINDNESS: THE EFFECTS OF PREFLASH ADAPTATION AND PUPIL SIZE Phase Report

J. H. Hill and Gloria T. Chisum 30 Jun. 1965 20 p refs

(NADC-ML-6508; AD-629589) CFSTI: HC \$1.00/MF \$0.50

A question of considerable operational importance is the extent to which the blinding effect of a flash from a nuclear weapon will vary with the ambient light level. Under conditions of darkness, the size of the pupil and the sensitivity of the eye are maximized. With an increase in the ambient light level both the sensitivity of the eye and the pupil size decrease. Data are presented on the independent effects of pupil size and receptor adaptation level on the production of flashblindness by high intensity, short-duration flashes.

Author (TAB)

N66-22617# Little (Arthur D.), Inc., Cambridge, Mass.

A THERMAL RADIATION HEAT SOURCE AND IMAGING SYSTEM FOR BIOMEDICAL RESEARCH Phase Report

David L. Richardson Johnsville, Pa., Naval Air Develop. Center, 15 Dec. 1965 48 p refs

(Contract N62269-1388)

(NADC-MR-6503; AD-629590) CFSTI: HC \$2.00/MF \$0.50

The purpose of this investigation was to provide a more advanced radiant heat source capable of heating an area of 1 cm² with up to 15 cal/cm² sec of radiant heat flux with a uniformity of ± 1 percent. The source and the optical imaging system were to provide a high degree of stability and reproducibility for extended periods. The imaging system is to be used in a study of the effects of intense thermal-radiation on living tissues being carried out at the U.S. Naval Air Development Center in Johnsville, Pa. The specified radiant heat flux and uniformity has been achieved by using a resistance heated graphite element, 16 mm wide and 38 mm long, as the radiation source in conjunction with a compound thermal imaging system. A heat flux-redistributor installed external to the system provided the desired flux uniformity. An operation manual for the source and imaging system is included as an appendix to the report.

Author (TAB)

N66-22620# School of Aerospace Medicine, Brooks AFB, Tex. **THE KINETICS OF RECUPERATION FOLLOWING 55 MEV PROTON IRRADIATION, 28 APRIL-30 JUNE 1965**

Glenn V. Dalrymple, Ian R. Lindsay, John C. Mitchell, James D. Hall, and Ira L. Morgan (Texas Nucl. Corp.) Feb. 1966 11 p refs Prepared in cooperation with Texas Nucl. Corp.

(Contract AF 41(609)-2418)

(SAM-TR-66-5; AD-629723) CFSTI: HC \$1.60/MF \$0.50

The kinetics of recuperation following initial doses of 470 rads of 55 MeV protons and 350 rads of Co γ radiation were investigated by means of the paired-dose method. By using semilog plots, recovery half-times of $4.85 \pm .85$ days and $2.02 \pm .45$ days were found after initial doses of the protons and Co γ radiation, respectively.

Author (TAB)

N66-22623# Cincinnati Univ., Ohio.

A COMPARISON OF FORWARD AND BACKWARD CHAINING TECHNIQUES FOR THE TEACHING OF VERBAL SEQUENTIAL TASKS Final Report, Jan.-Jul. 1965

Kirk A. Johnson (Aerospace Med. Res. Labs.) and R. J. Senter Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 refs

(Contract AF 33(615)-1046)

(AMRL-TR-65-203; AD-628944) CFSTI: HC \$1.60/MF \$0.50

Three experiments were conducted to determine the relative merits of forward and backward chaining in the learning of sequential (serial) tasks. Previous research with animals has indicated the superiority of backward chaining and this principle frequently has been proposed for human learning. In all experiments the materials consisted of lists formed from familiar items (numbers, letters, words) arranged in arbitrary sequences. In the forward-chaining technique the subject begins by practicing the first item in the sequence. Next he practices the first and second and third items, and so on until he is practicing the entire sequence. In the backward-chaining technique the subject begins by practicing the last item in the sequence. He then practices the next-to-the-last and last items, then the third-from-last, next-to-last, and last items, and so on until he is practicing the entire sequence. In all three experiments, the forward-chaining technique was superior to the backward-chaining technique. In the first experiment, this difference was not reliable, but in each of the remaining experiments, it was.

Author (TAB)

N66-22632# Naval Air Engineering Center, Philadelphia, Pa. Aerospace Crew Equipment Lab.

ANTHROPOMETRY OF NAVAL AVIATORS—1964

Edmund C. Gifford, Joseph R. Provost, and John Lazo 8 Oct. 1965 114 p refs
(NAEC-ACEL-533; AD-626322) CFSTI: HC \$4.00/MF \$0.75

Body size data for 96 measurements of 1,549 U.S. naval aviators are presented. The techniques of measurement are illustrated by schematic drawings and reference to the literature. Both diametral and surface measurements are included. Dimensions are given in both centimeters and inches. Statistics included are percentiles, means, standard deviations, and coefficients of variation. These data are presented for use by designers of aircraft workspaces and designers of personnel protective clothing and equipment. Author (TAB)

N66-22636# Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

THE EFFECTS OF CONTROL LOCATION UPON PERFORMANCE TIME FOR KNOB, TOGGLE SWITCH, AND PUSH BUTTON Final Report, Mar.-Jun. 1962

Earl D. Sharp and John P. Hornsesh Oct. 1965 22 p refs
(AMRL-TR-65-41; AD-626610) CFSTI: HC \$1.00/MF \$0.50

Nine subjects, each restrained in an aircraft seat, operated (with their left hand) each of three controls (knob, toggle switch, and push button) at each of 36 locations. Performance time scores for each of the controls were compared and contour maps were constructed to display performance-location relationships. These contour maps show that the fastest performance time area for all controls is approximately 25° to the left of the midsagittal plane and 25 inches above the seat reference point. The fast performance area for the toggle switch is considerably smaller than that for the knob or push button, suggesting that the selection of a location for a toggle switch may represent a more critical design problem. An analysis of variance of the performance data provided additional comparisons in terms of the effect of angular displacement and console array distance. Author (TAB)

N66-22646# Toronto Univ. (Ontario). Inst. for Aerospace Studies.

THE DESIGN OF A FACILITY FOR THE MEASUREMENT OF HUMAN PILOT DYNAMICS

Lloyd Reid Jun. 1965 68 p refs

(Grant AF-AFOSR-222-64)

(UTIAS-TN-95; AD-627570) CFSTI: HC \$3.00/MF \$0.75

The report describes the modification of the UTIAS CF-100 flight simulator and the development of a data analysis technique in order to study human operators in a realistic flight environment. The operator forms part of a closed loop system which may consist of one or two degrees of freedom. A method of analyzing data obtained from short record runs is presented which is similar to the well known cross-correlation, cross-power spectral density method. Author (TAB)

N66-22674# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

ISONIAZID THERAPY IN THE CHIMPANZEE Interim Report, Dec. 1964-Dec. 1965

J. Fineg, W. C. Hanly, J. R. Prine, D. C. Van Riper, and P. W. Day Jan. 1966 22 p refs

(ARL-TR-66-1; AD-629076) CFSTI: HC \$2.60/MF \$0.50

Three chimpanzees were diagnosed as having pulmonary tuberculosis (diagnosis based upon PPD test and chest X-rays). Two of the animals were necropsied and diagnosis confirmed. The remaining TB positive-chimpanzee was housed with three chimpanzees which had shown a negative reaction to the tuberculin test. All subjects were put on an initial dose of 10 mg/kg body weight of isoniazid per day. The following experiment, consisting of four major objectives, was designed: (1)

to evaluate the use of isonicotinic acid hydrazide (INH) as a single agent against tuberculosis, (2) to determine the effective therapeutic and/or prophylactic dose and level of INH, (3) to determine the rate of inactivation of INH in the chimpanzee, and (4) to determine the toxic level of INH in the chimpanzee. The single TB positive chimpanzee remained on 10 mg/kg body weight of INH per day while the others were given varying doses to determine toxicity levels and inactivation times. The experiment ran 1 year during which time all subjects were TB tested (PPD, KOT, intrapalpebral) and chest X-rays were taken monthly. At the end of the time period, all subjects were subjected to necropsy to verify findings. Author (TAB)

N66-22675# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.

CNU-1/P SUSTENANCE KIT MODIFICATION (T-33)

John R. Schumann Nov. 1965 18 p

(AAL-TR-65-22; AD-629347) CFSTI: HC \$1.60/MF \$0.50

The project was established to provide adequate cold-weather survival protection for T-33 pilots who utilize the seat-pack parachute. Pilots in this category had not previously been so equipped. After extensive evaluation and operational testing, the Alaskan Air Command approved modification of CNU-1/P for use with the seat-pack parachute in the T-33 jet aircraft. The kit is now in use during the period October through May. In addition to basic survival items, the kit contains a down-filled coat, SRU-6P; mittens, SRU-10P; and half bag or foot sack, SRU-12P. The problem of bulk reduction was solved by tufting, using manual pressure and upholstering methods. Packaging of the down-filled clothing into the CNU-1/P kit can be done by local personal equipment technicians with a small expenditure of man-hours and materials. Author (TAB)

N66-22686# Cincinnati Univ., Ohio.

REVIEW OF MNEMONICS AND MNEMONOTECHNICS FOR IMPROVED MEMORY Final Report, Jun.-Oct. 1965

R. J. Senter Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 27 p refs

(Contract AF 33(615)-1046)

(AMRL-TR-65-180; AD-629594) CFSTI: HC \$2.00/MF \$0.50

A review is made of books on mnemonics and mnemonotechnics. These are techniques for improving the efficiency of memory. These books describe the effect on memory of common principles of learning, such as, motivation, attention, and rehearsal. They also illustrate the use of simple mnemonics, such as "ROY G. BIV" for remembering the hues of the visual spectrum. More extensive descriptions, however, are provided of more complex mnemonic systems, such as, the so-called "hook" or "peg" systems. With the hook system, information in serial order is retained by aid of vivid, even bizarre, visual images. The information to be retained is incorporated into a visual image which had been previously associated with a number. The report includes some uses of these techniques and some personal observations and analyses. These techniques offer interesting possibilities for improving the retention of technical information. Research on these techniques probably would be profitable. Author

N66-22697# Boston Univ., Mass. Hypothermia Lab.
ANTIARRHYTHMIC ACTIVITY OF ANTAZOLINE AND ITS APPLICATION TO THE CONTROL OF HYPOTHERMIC VENTRICULAR FIBRILLATION Final Report, Feb. 1963-Apr. 1965

E. T. Angelakos Wright-Patterson AFB, Ohio, AMRL, Dec. 1965 37 p refs
(Contract AF 33(657)-10755)

(AMRL-TR-65-201; AD-629548) CFSTI: HC \$2.00/MF \$0.50

The chemistry and general pharmacology of antazoline and experimental studies employing it are reviewed to determine the antiarrhythmic activity and the protective effect of antazoline against hypothermic ventricular fibrillation. In hypothermic ventricular fibrillation and in clinically observed heart disorders, the antiarrhythmic activity of antazoline was often superior to other pharmacological agents, including quinidine. The incidence of side effects, notably nausea or vomiting, was found to be related to the dosage. Since the basis of the antiarrhythmic activity of antazoline is essentially unknown, further studies in this direction are warranted to provide for systematic development of more effective compounds.

Author

N66-22711# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

A LIGHT NOT VISIBLE TO THE EYE

A. Turov 12 Oct. 1965 7 p Transl. into ENGLISH from Izv. (Moscow), 13 May 1965 p 4

(FTD-TT-65-1144/1+4; AD-622498) CFSTI: HC \$1.00/MF \$0.50

The phenomenon of chemoluminescence emanating from living organisms, both plant and animal, is discussed. Considered are the use of instrumentation, such as photoamplifiers, by which the degree that oxidation in the organism is slowed under the effect of an inhibitor can be determined; the use of the concept for detecting malignant tumor cells; and the possibility for using light signals to study the workings of a living thinking brain.

L.S.

N66-22718# Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

FEASIBILITY STUDY: LATERAL IMPACT WITH STANDARD AIRCRAFT HARNESS CONFIGURATION

Jerry D. Rothstein and William K. Brown Feb. 1966 27 p refs
(ARL-TR-66-3; AD-629077) CFSTI: HC \$2.60/MF \$0.50

A series of 11 impact tests using the daisy decelerator was accomplished to evaluate the adequacy of restraint from lateral impact forces of up to 14 sled G using as minimal restraint, standard aircraft harness and a non-contoured seat. Standard harness would offer greater range of movement to the restrained subject than would be offered by a more complex harness previously proposed and tested for project Apollo. Results of these 11 tests demonstrated adequacy of restraint with the standard harness at tested impact profiles. It was also observed that when the torso was not laterally supported a shallow, 5.08 cm (2-inch) deep head support was adequate at sled G less than 10 g; above 10 sled G this shallow head support was preferred to a deeper, 17.8 cm (7-inch) head support so that at impact the subject's head can rise out and over the shallow support thereby minimizing the shearing force between the head and laterally moving torso. It was also observed that amplification of G from seat to subject was about the same for both harnesses even though input force was greater in the series using standard harness. This observation suggested greater absorption of impact force by torso movement and strap stretch with standard harness than almost entire force absorption by the rigidly restrained body with more complex harness.

Author (TAB)

N66-22722# Hawaii Univ., Honolulu. Pacific Biomedical Research Center.

AMELIORATIVE MEASURES IN FASTING, SUBARCTIC SURVIVAL SITUATIONS Progress Report, 1 Jan.-1 Jun. 1964

Terence A. Rogers, James A. Setliff, and Alan C. Buck Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Nov. 1965 12 p refs

(Contract AF 41(609)-1918)

(AAL-TR-65-10; AD-628897) CFSTI: HC \$1.60/MF \$0.50

The experiment was undertaken to explore practicable measures that might minimize dehydration and other metabolic derangements in a fasting, Arctic survival situation. Twenty-eight men, divided into four groups, were fed a standard diet of USAF IF No. 10 rations in barracks for two days, then subjected to a three-day simulated survival situation, followed by two days of standard diet in barracks. Group A received no supplements, group B received an electrolyte supplement administered as 150 meq nacl the first day and 150 meq NaHCO₃ the next two days, group C 500 kcal as sucrose, and group D 500 kcal as sucrose plus electrolyte as in B. Results suggest that a survival ration could, with benefit, comprise 500 kcal/day of carbohydrate supplemented with a sodium salt, as this combination ameliorates dehydration, hypoglycemia and ketonuria ordinarily associated with a survival situation. Provision of sodium as bicarbonate did not appear to be of any advantage.

Author (TAB)

N66-22725# Bryn Mawr Coll., Pa. Dept. of Biology.

THE EFFECT OF ENVIRONMENTAL TEMPERATURE ON LETHALITY OF ENDOTOXIN AND ITS EFFECT ON BODY TEMPERATURE IN MICE Final Report, 1 Mar.-31 May 1965

L. Joe Berry Ft. Wainwright, Alaska, Arctic Aeromed. Lab., Dec. 1965 24 p refs

(Contract AF 41(609)-1764)

(AAL-TR-65-12; AD-629003) CFSTI: HC \$2.60/MF \$0.50

Acute exposure of mice to an environmental temperature of either 5°C or 37°C reduced the LD₅₀ of a crude serrata marcescens endotoxin from a high of 2300-micrograms in mice housed at 30°C to an amount less than 40 micrograms. At 15°C or 32°C, the LD₅₀ was, respectively, 800 micrograms and 550 micrograms, while at 25°C it was 1200 micrograms. Control animals placed at each of these temperatures were able to maintain normothermia except for those at the high and low extremes where they became slightly hyperthermic and hypothermic. Following an injection of either twice the LD₅₀ or a dose of 1000 micrograms, the thermoregulatory ability was upset at all temperatures except 30°C. Mice at temperatures below 30°C became progressively more hypothermic as the environment was increasingly cold and vice versa at higher temperatures. It is believed that endotoxin sensitizes mice to heat and cold rather than these temperatures sensitizing to endotoxin. After one week of acclimatization at 5°C or 37°C, the LD₅₀ of endotoxin increased, respectively, to 790 micrograms and 260 micrograms. Inducibility of the liver enzyme tryptophan pyrrolase, believed to play a role in an animal's response to endotoxin, was evaluated at each environmental temperature. Only at the extremes was it suppressed.

Author (TAB)

N66-22730# Naval Air Development Center, Johnsville, Pa. **PSYCHOPHYSICAL METHODOLOGY. I: COMPARISON OF THRESHOLDS OF THE METHOD OF LIMITS AND OF THE METHOD OF CONSTANT STIMULI**

Robert M. Herrick 31 Dec. 1965 18 p refs

(NADC-MR-6507; AD-628994) CFSTI: HC \$1.60/MF \$0.50

In 'yes'-no psychophysical experiments assume that the greater the intensity of the stimulus, the greater the

probability of a 'yes' response. On the basis of this assumption (a) the relationships between the method of limits and the method of constant stimuli are derived, (b) a procedure for comparing data obtained by the two methods is recommended, (c) a procedure for comparing ascending and descending series within the method of limits is given. Author (TAB)

N66-22732# School of Aerospace Medicine, Brooks AFB, Tex.

OXYGEN CONCENTRATION, TEMPERATURE, AND VISCOSITY DETERMINATIONS: POLAROGRAPHIC TECHNIC Final Report, Jun.-Oct. 1965

Edward A. Rice and Robert E. Vopat Dec. 1965 13 p refs (SAM-TR-65-89; AD-628892) CFSTI: HC \$1.60/MF \$0.50

A technique was developed for determining the effects of ionizing radiation on molecular oxygen concentration in an aqueous solution. The polarographic principle was used for determining oxygen concentration, temperature, and viscosity of solution, and oxygen concentration in gas. The polarographic system has the following principal characteristics: (1) parameters can be remotely measured, permitting the system to be used in environments hostile to observers, i.e., radiation; (2) temperature measurement can be made within 1°C; (3) changes in temperature are recorded instantly; (4) oxygen concentration can be measured with a resolution well within 1 mm hg; and (5) oxygen changes are recorded instantly. Author (TAB)

N66-22737# Naval Training Device Center, Port Washington, N. Y.

EFFECTIVENESS AND STUDENT ACCEPTANCE OF INDIRECT PAIRED ASSOCIATES LEARNING Final Report

George Chajet 1 Feb. 1966 65 p refs (NAVTRADEVCE-1 H-42; AD-628449) CFSTI: HC \$6.60/MF \$0.75

Direct learning, a conventional paired-associates memorizing task was compared with indirect learning, a game-like memorizing task. The two learning tasks were studied under two conditions: no task overloading and task overloading. Two hundred college students with Verbal SAT scores of 500 or below participated in short learning tasks. It was found that: (1) Direct learning is superior when learning is measured by recall. (2) The two learning tasks are about equally effective when learning is measured by recognition. (3) Direct learning elicits less favorable attitudes. (4) Direct learning appears less resistant to task overloading. Author (TAB)

N66-22764# Naval Research Lab., Washington, D. C.
INSTALLATION OF A HOMING BEACON IN A FLotation VEST FOR CARRIER FLIGHT DECK PERSONNEL

G. E. Hart, F. Mattison, and V. Gagner 15 Dec. 1965 14 p (NRL-MR-1668; AD-627436) CFSTI: HC \$1.00/MF \$0.50

The latest approved model of flotation vest for carrier flight deck personnel was obtained for instrumentation tests. In the event a man falls overboard, there is a need for a radio beacon to provide a homing signal. The situation calls for a beacon that will not require any cooperative assistance from the victim, who may be unconscious. A miniature beacon is under development at NRL that may provide an effective solution provided a reliable means of turning it on can be developed. A flexible built-in antenna that is completely covered by the fabric of the vest appears to provide a solution to the antenna problem. Radio dark room tests gave very promising results. Tests while floating in salt water will be performed as soon as equipment now under construction is available. Author (TAB)

N66-22766# Naval Radiological Defense Lab., San Francisco, Calif.

LONGEVITY IN NEUTRON-EXPOSED GUINEA PIGS

Donald J. Kimeldorf, Richard D. Phillips, and Dave C. Jones 2 Feb. 1966 20 p refs (USNRDL-TR-941; AD-626997) CFSTI: HC \$1.00/MF \$0.50

Life span data has been accumulated for male guinea pigs from a specific pathogen free Hartley strain colony, maintained on a vitamin C supplemented diet. Observations were made on 25 sham-irradiated controls and 78 animals exposed as young adults to a simulated fission energy spectrum of neutrons obtained by the bombardment of a thick beryllium target with 12 MeV protons. The neutron-exposed groups included 18 animals subjected to a high sublethal dose (100 rads, first collision dose), and 60 animals which were the 30-day survivors of 120-160 rad doses. Approximately 11 to 72% of the animals died during the first 30 days after 120-160 rads. It was found that the median age at death for the sham-exposed controls was 828 days. The median age at death was 730 days for animals exposed to the sublethal dose and 698 days for the survivors of the 30-day lethal dose range. Both median life span values are significantly ($p < 0.01$, analysis of variance) smaller than that for controls. The observations in the guinea pig regarding a reduction in life span after a single total-body exposure to neutrons, corroborate in an additional species, the conclusions previously based solely on studies on rats and mice. Author (TAB)

N66-22768# Aerospace Medical Div., Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

HUMAN PERFORMANCE AS A FUNCTION OF CHANGES IN ACOUSTIC NOISE LEVELS Final Report, Jun. 1964-Feb. 1965

Richard W. Shoenberger and Charles S. Harris Dec. 1965 20 p refs

(AMRL-TR-65-165; AD-628498) CFSTI: HC \$1.00/MF \$0.50

Psychomotor performance of 16 subjects was evaluated under four noise conditions, during four test sessions, in a Latin square design. Three experimental conditions each began with different intensities of noise (Quiet, 85 dB). After 30 minutes exposure the noise was changed to a final high intensity level (110 dB), which lasted for 15 minutes. The fourth condition served as a control, in which Quiet prevailed throughout the entire 45 minute period. The results partially supported the hypothesis that greater changes in noise levels produce greater decrements in performance. There was, however, a strong interaction between noise conditions and sessions. The nature of this interaction indicated that this phenomenon does not occur uniformly throughout the course of learning, and probably is of lesser importance for well learned tasks. Author (TAB)

N66-22783# School of Aerospace Medicine, Brooks AFB, Tex.

F-101/F-106 FLIGHT SIMULATOR FLASHBLINDNESS EXPERIMENT, MARCH-JUNE 1965

James E. Hamilton Dec. 1965 17 p refs (SAM-TR-65-82; AD-628552) CFSTI: HC \$1.60/MF \$0.50

An investigation was made to determine the effect of flashblindness on aircraft control in the F-106A and the F-101B flight simulators. In addition, a study was made to determine how much cockpit illumination is required to reduce flashblindness to minimum recovery time. It was found that approximately 42% of the flashblinded pilots tested did not accomplish a programmed escape maneuver. Instrument panel floodlighting immediately after the flash significantly

reduced recovery time. Floodlighting the panel with 300 ft.-c. illumination did not significantly reduce recovery time more than illumination with 100 ft.-c. Author (TAB)

N66-22784# Naval Air Development Center, Johnsville, Pa. QUANTITATIVE RELATIONS AMONG MEASURES OF BEHAVIOR UNDER A FIXED-INTERVAL SCHEDULE OF REINFORCEMENT

Robert M. Herrick 6 Dec. 1965 14 p refs /ts Rept.-16 (NADC-MR-6506; AD-628149) CFSTI: HC \$1.60/MF \$0.50
Behavior of subjects under a fixed-interval schedule of reinforcement is often represented in a plot of cumulative responses versus time. Three performance measures were suggested to characterize the behavior represented in such a plot: the index of curvature, the quarter life, and the first half ratio. The paper describes the quantitative relationships among these three measures. Author (TAB)

N66-22785# Hine Labs., Inc., San Francisco, Calif. RESEARCH ON THERAPY OF PULMONARY EDEMA ASSOCIATED WITH OXIDIZERS Final Report, 15 May 1964-30 Jun. 1965

Charles H. Hine, Richard D. Cavalli, and Robert R. Wright Wright-Patterson AFB, Ohio, AMRL, Nov. 1965 49 p refs (Contract AF 33(615)-1781)

(AMRL-TR-65-178; AD-628593) CFSTI: HC \$4.60/MF \$0.50
An evaluation was made of candidate therapeutic agents for the treatment of acute pulmonary edema resulting from nitrogen dioxide exposure. Treatments consisting of hyperbaric air and oxygen; tracheal toilet; ethyl, isopropyl, and octyl alcohol vapors; hydralazine; bethanechol; physostigmine; and isoproterenol aerosols produced no change in the mortality, survival time, or lung/body weight ratios of rats suffering from NO₂ induced acute pulmonary edema. Rutin in large doses caused a decrease in mortality and an increase in survival time of exposed rats. Intravenous infusion of isoproterenol caused a decrease in mortality in rabbits exposed to NO₂. The effectiveness of hyperbaric oxygen, hydrocortisone, rutin and bethanechol against moderate exposure to NO₂ was determined by solvent uptake measurements with rats. Oxygen administered 4 hours after exposure increased solvent uptake. There were no significant effects due to the other compounds. Author (TAB)

N66-22792# Medical Biological Lab. RVO-TNO, Rijswijk (Netherlands).

PHYSICO CHEMICAL AND BIOLOGICAL PROPERTIES OF BACTERIOPHAGE DNA DURING REPLICATION [FYSISCH CHEMISCHE EN BIOLOGISCHE EIGENSCHAPPEN VAN BACTERIOFAAG DNA TIJDENS DE VERMENIGVULDIGING] P. H. Pouwels Mar. 1965 117 p refs In DUTCH; ENGLISH summary

(MBL/1965/6; TDCK-44603) CFSTI: HC \$4.00/MF \$0.75
Investigations on the replication of the DNA of bacteriophage T₄ and $\phi\chi$ 074, and on the physicochemical and biological properties of double stranded $\phi\chi$ DNA are reported. Experimental details are given on Escherichia coli B infected with phage T₄, and on intracellular T₄ DNA. Measurements were made of the optical density and biological activity of the intracellular T₄ DNA. Alkali denatured double stranded $\phi\chi$ DNA, and single stranded $\phi\chi$ DNA were irradiated with ultraviolet light. Among the conclusions reported are: parental DNA was characterized as double stranded DNA; no fragmentation of parental phage DNA takes place before replication; parental DNA accounts for the preservation of genetic informa-

tion; intracellular phage DNA formed by replication was characterized as double stranded DNA of high molecular weight; and the alkali denatured double stranded $\phi\chi$ DNA has properties in common with both the single and double stranded $\phi\chi$ DNA. The difference in biological activity after irradiation may be explained by assuming that double stranded $\phi\chi$ DNA can be restored by the host, while the single stranded cannot. N.E.N.

N66-22802# Deutsche Versuchsanstalt für Luft- und Raumfahrt, Bad Godesberg (West Germany).

THE INFLUENCE OF PYROGENS ON INTRAVASAL GAS BUBBLE FORMATION IN RAPID DECOMPRESSION TESTS [DIE BEEINFLUSSUNG DER INTRAVASALEN GASBLASENBILDUNG IM DRUCKSTURZVERSUCH DURCH PYROGENE STOFFE]

E. Segadlo Dec. 1965 53 p refs In GERMAN; ENGLISH summary

(DLR-FB-65-57; DVL-448) CFSTI: HC \$3.00/MF \$0.50

To answer the question of the influence of pyrogens on intravenous gas bubble formation in rapid decompression, tests have been performed with rabbits and albino rats, using the pyrogenetic drugs PYRIFER and PYREXAL. As compared with untreated animals, the results showed a reduced gas bubble formation in the majority of cases. The problem is discussed to which extent the development of gas bubbles is influenced by a reduced solubility of the physically bound gases or by physiological changes in the animal organism. Author

N66-22803# European Organization for Nuclear Research, Geneva (Switzerland).

SIMULATED COSMIC-RAY IRRADIATION WITH 600 MEV PROTONS. VOLUME TWO, FIRST PART: ELECTROPHORETICAL STUDIES OF BLOOD PROTEINS (MSC-1 AND MSC-2 EXPERIMENTS ON MICE)

Antonio Pasinetti (Milan Univ.) Feb. 1966 154 p refs (CERN/HER/AP-1-66) CFSTI: HC \$4.00/MF \$1.00

The electrophoretical studies of serum proteins in mice after subjection to ionizing radiations are reported. Two groups of Swiss white mice, one feeding and one fasting, were subjected to whole body irradiation with a 600 MeV proton beam, and sacrificed at intervals from one to eighty days. A quantitative determination of the total proteins was made, and the total proteins, lipoproteins, and glycoproteins were studied by electrophoretical methods. The total albumin and total globulins were also determined. In general, the behavior of the total proteins was found to be irregular. The albumins were characterized by a small decrease in percentage until the 20th to 30th day, and then remained far below the control level until the 67th day. The total globulin behavior was approximately the same as for albumins. The results of these experiments were compared with results previously reported. N.E.N.

N66-22837# United Kingdom Atomic Energy Authority, Harwell (England). Health Physics and Medical Div.

THE RESPONSE OF A MOVING GEIGER PROBE TO DISCRETE SOURCES OF BETA RADIATION

J. E. Cook Nov. 1965 32 p refs (AERE-M-1671) HMSO: 4s

Recent experiments have shown that the efficiency with which the average person detects contamination on his clothing with a contamination monitor is considerably less than was hitherto supposed. The present paper investigates the response of a standard instrument when its geiger probe is moved over

radioactive sources at different distances and velocities. The results are compared with a simple theory which is applicable if the time constant of the ratemeter is greater than the time during which the moving probe records counts from the source. The peak response is found to be inversely proportional to velocity and not strongly dependent on distance. Detection thresholds in terms of source strength are in the range 0.01 to 0.1 μ c. The X1 range, 0-5 counts per second, of the BN110 ratemeter is found to have a dead time of about 25 milliseconds which much reduces response. It is concluded that on the X1 range the instrument is unsuitable for contamination monitoring. Author

N66-22853# Argentina. Comision Nacional de Energia Atomica, Buenos Aires.

DETERMINATION OF IODURIA BY ISOTOPIC EQUILIBRIUM [DETERMINACION DE LA YODURIA POR EQUILIBRIO ISOTOPICO]

Oswaldo Jorge Degrossi 1965 17 p refs In SPANISH (CNEA-169) CFSTI: HC \$1.00/MF \$0.50

This paper describes a method for determining ioduria based on the administration of a single dose of iodine 131 tracer and an understanding of iodemia. Urine and blood samples were taken from a group of 21 patients during a 24 hour period at different intervals after administering the tracer to chemically determine the iodemia and ioduria. From the blood and urine radioactivity, the iodide contents in the blood and urine were calculated and compared. Results indicate that the specific activity of blood and urine are similar 72 hours after administering the tracer, and even more so between 120 and 144 hours. The method is simple and exact enough to study large numbers of patients, and is especially useful in areas where there are no adequate facilities for chemical analysis. R.N.A.

N66-22859# Istituto Superiore di Sanita, Rome (Italy). Laboratori di Fisica.

PAPERS PRESENTED BY THE PHYSICS LABORATORY AT THE 2nd NATIONAL MEETING ON BIOPHYSICS DEVOTED TO BIOLOGY AND MOLECULAR BIOPHYSICS, PART I [COMUNICAZIONI PRESENTATE DAI LABORATORI DI FISICA AL 2nd CONVEGNO NAZIONALE DI BIOFISICA DEDICATO ALLA BIOLOGIA E BIOFISICA MOLECOLARE, PARTE I]

20 Jun. 1965 47 p refs In ITALIAN; ENGLISH summary Meeting held at Rome, 18-20 Jun., 1965 (ISS-65/21, Pt. I) CFSTI: HC \$2.00/MF \$0.50

The papers contained in the first part deal with (1) studies on interactions between ribosomal RNA and denatured DNA of *B. stearothermophilus*, in which a new type of DNA-RNA hybrid, at room temperature, is studied; this hybrid involves only one half of the total DNA; (2) the possibilities of the preparative separation of the two strands of phage α DNA by loading one of them with RNA; and (3) the action spectrum of UV irradiation of DNA; this analysis is done very accurately using a UV monochromator, and the possible interpretations of the results are discussed. Author

N66-22872# United Kingdom Atomic Energy Authority, Risley (England). Reactor Group.

ACTION OF ^{90}Sr - ^{90}Y ON DEVELOPING KHAMSA SPAWN
G. G. Polikarpov and V. N. Ivanov 1966 17 p refs Transl. into ENGLISH from Voprosy Ikhtiologii (Moscow), v. 1, no. 3(20), 1961 p 583-589 (TRG-166(W)) HMSO: 2s

Effects of various concentrations of strontium 90-Yttrium 90 solutions on the early development stages of fish eggs were studied. Harmful reactions manifested themselves as destruction of developing eggs in the early stages, retardation of the separation of the young, and various types of abnormalities. Observed were vertebral deformations (bending of the spine in dorsoventral and lateral directions), as well as cyclopean, acephalic, microphalic, and bicaudal deformations; disturbance of the yolk sac disposition and sorption of the yolk; and abnormal pigmentation of eye and body. Harmful effects were already observed with Sr^{90} - Y^{90} concentrations in sea water of 10^{-10} c/liter and higher. Accumulation coefficients of Y^{90} in spawn after 3 hours were 325 times higher than those of Sr^{90} after the same period. The biological action of Sr^{90} - Y^{90} solutions on the growth of fish spawn was attributed mainly to Y^{90} . G.G.

N66-22885# Institut National de la Recherche Agronomique, Dijon (France). Station d'Amelioration des Plantes.

COMPARISON OF THE EFFECTS OF VARIOUS MUTAGENIC SUBSTANCES BY STUDYING THE MUTAGENESIS OF SOME TYPICAL PLANTS [COMPARAISON DES EFFETS DE DIFFERENTES AGENTS MUTAGENES PAR L'ETUDE DE LA MUTAGENESE DE QUELQUES PLANTES-TYPES—RAPPORT DE SYNTHESE 1962-1963-1964]
Synthesis Report, 1962-1964

P. Dommergues, J. Gillot, H. Touvin, R. Bodergat, and M. le Couvieur Brussels, EURATOM, Feb. 1966 38 p refs In FRENCH; ENGLISH summary (Contract EURATOM-010-61-12 BIOF) (EUR-2715.f) CFSTI: HC \$2.00/MF \$0.50

This report shows how gamma radiation can profitably be used on plants with vegetative reproduction, for the purpose of either exploring chimera structures or inducing new mutations. It gives a wide-ranging description of the various treatment methods and the culture techniques most likely to produce a high mutagenic yield, and cites a number of partial results obtained with fruit-trees, rose-trees and American carnations. As regards sexually-reproducing plants, the report sets out a treatment, production and mutation-isolation method for each of the species studied, in relation to their proper floral biology and to the scheduled research aims. It examines the action of radiation as compared with that of chemical mutagens, including ethyl methane sulphonate and neutral ethyl sulphate. The results reported here show that in most cases the chemical treatments had a more intense action in both the surface layers and the deep layers. Lastly, the report points out the advantages to be gained from the mutations thus induced. Author

N66-22910*# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.

AN INVESTIGATION OF THE VISUAL SAMPLING BEHAVIOUR OF HUMAN OBSERVERS

J. W. Senders, J. I. Elkind, M. C. Grignetti, and R. Smallwood Washington, NASA, Apr. 1966 171 p refs (Contract NAS1-3860)

(NASA-CR-434) CFSTI: HC \$2.25/MF \$1.00 CSCL 05E

Experiments on human visual sampling behavior were conducted to verify simple theories about frequency and duration of visual fixation, and about transition from one point of fixation to another. Ideas about conditional sampling behavior were incorporated into the extended theory, in which the observer's intersample interval is a function of the value of the signal read on the previous sample. In addition, the idea is advanced that, due to the single-channelness of attention, queuing theory provides a general method of analyzing attention switching, the attentional demand of a stimulus source, the probability of simultaneous demand from two or more

stimuli, and the notion of overload. Conditional sampling models are used to provide the probability distribution which enter into the queueing model. The interaction between required accuracy and effective bandwidth is examined, and some aperiodic sampling models are given. It was concluded that the bandwidth of the monitored signal is the most important factor influencing the frequency of fixation on that signal, if the signal power is set at some fixed level. M.G.J.

N66-22967# Joint Publications Research Service, Washington, D. C.

BIOCHEMICAL INDICES IN IONIZING RADIATION

14 Mar. 1966 20 p refs Transl. into ENGLISH from Med. Radiol. (Moscow), v. 10, no. 12, Dec. 1965 p 51-57, 63-66 (JPRS-34549; TT-66-30989) CFSTI: \$1.00

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1. UTILIZATION OF CERTAIN BIOCHEMICAL INDICES FOR THE EVALUATION OF THE EFFECT OF IONIZING RADIATION ON THE ORGANISM T. A. Sviderskaya p 1-10 refs (See N66-22968 12-04)

2. CERTAIN BIOCHEMICAL INDICES IN INNERVATION DISTURBANCES OF THE MOTOR APPARATUS CAUSED BY ACTION OF IONIZING RADIATION E. N. Sadchikova p 11-17 refs (See N66-22969 12-04)

N66-22968 Joint Publications Research Service, Washington, D. C.

UTILIZATION OF CERTAIN BIOCHEMICAL INDICES FOR THE EVALUATION OF THE EFFECT OF IONIZING RADIATION ON THE ORGANISM

T. A. Sviderskaya *In its Biochem. Indices in Ionizing Radiation* 14 Mar. 1966 p 1-10 refs (See N66-22967 12-04) CFSTI: \$1.00

Experimental investigations on animals and observations of humans were conducted to determine a method for detecting early manifestations of chronic radiation sickness. The studies showed that the SH-groups content in the blood and the activity of alkaline phosphatase of the blood were sensitive indices. Characteristics changes were noted in these two areas in the course of development of an acute radiation sickness and upon prolonged action of small doses of ionizing radiation on the organism. R.N.A.

N66-22969 Joint Publications Research Service, Washington, D. C.

CERTAIN BIOCHEMICAL INDICES IN INNERVATION DISTURBANCES OF THE MOTOR APPARATUS CAUSED BY ACTION OF IONIZING RADIATION

E. N. Sadchikova *In its Biochem. Indices in Ionizing Radiation* 14 Mar. 1966 p 11-17 refs (See N66-22967 12-04) CFSTI: \$1.00

Results are presented of an investigation which was conducted in an attempt to trace the effect of changed innervation of the motor apparatus, induced by exposure to chronic radiation, on certain biochemical indices which are related to the functional state of the skeletal muscles. The procedures used are described and the results are discussed in detail. R.N.A.

N66-23007# Joint Publications Research Service, Washington, D. C.

LENIN PRIZE ENTRIES

A. Prokof'yeva-Bel'govskaya et al 21 Apr. 1966 20 p Transl. into ENGLISH from Russian Publ. (JPRS-35139; TT-66-31576) CFSTI: \$1.00

CONTENTS:

1. GENETICIST NIKOLAY PETROVICH DUBININ A. Prokof'yeva-Bel'govskaya and V. Khvostova p 1-3

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5. CLOSED FURNACES IN FERROALLOY PRODUCTION S. Zav'yalov p 12-13

N66-23014# Joint Publications Research Service, Washington, D. C.

CLINICAL STUDIES OF CARBON MONOXIDE POISONING AND OF RESUSCITATION

C. Z. Voronchuk et al 7 Apr. 1966 16 p refs Transl. into ENGLISH from Klin. Med. (Moscow), v. 44, no. 2, Feb. 1966 p 115-120

(JPRS-34950; TT-66-31388)

CONTENTS:

1. A RARE CASE OF SEVERE CARBON MONOXIDE POISONING G. Z. Voronchuk p 1-12

2. SUCCESSFUL RESUSCITATION AFTER PROLONGED VENTRICULAR FIBRILLATION A. P. Matusova, V. Ye. Murashko, I. K. Solov'yev, and N. M. Titarenko p 3-9 refs

N66-23024# Joint Publications Research Service, Washington, D. C.

SOVIET STUDIES IN PHYSIOLOGY

11 Apr. 1966 23 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (Moscow), v. 52, no. 2, Feb. 1966 p 172-178; 201-214

(JPRS-34987; TT-66-31425) CFSTI: \$1.00

Oxygen and carbon dioxide tension of the blood and isolated cerebral circulation are considered in two physiological papers. Under both ordinary conditions and hypoxia, it was found that oxygen tension is higher in venous blood coming through the external jugular vein than in mixed venous blood in the right atrium. When hypoxia develops, the reduction in blood and brain tissue pO_2 is accompanied by a marked decrease in partial CO_2 pressure in both arterial and venous blood in the brain. When hyperventilation develops, the marked decrease in pCO_2 in arterial blood is accompanied by an increase in pO_2 in the arteries and a marked reduction in pO_2 in venous blood flowing from the brain and in the brain tissue. Circulation of the brain is studied by using a model of a circulatorily isolated dog's head and sinocarotid zone, with cross blood supply. Procedure for preparing the model as well as the experimental and donor dogs is detailed. This model was found to be effective in a study of reflex effects of the cavernous sinus, dura mater, and sinocarotid zone on cerebral blood flow. M.W.R.

N66-23046# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

TENTH CONFERENCE OF THE I.P. PAVLOV ALL-UNION PHYSIOLOGICAL SOCIETY, YEREVAN, 1964. VOLUME I: ABSTRACTS OF SYMPOSIA PAPERS

30 Sep. 1965 323 p Transl. into ENGLISH of the Publ. "X Sbezd Vsesoyuznogo Fiziologicheskogo Obshchestva imeni I. P. Pavlova, Yerevan, 1964 Tom I: Referaty Dokladov na Simpoziumakh" Moscow, Izd. "Nauka", 1964 180 p (FTD-TT-65-46/1+2; AD-628309)

Contents: Physiology of the nerve cell and synaptic transmission; Mathematical analysis of experimental and clinical electroencephalograph data; Biophysiological bases of bioelectric activity; Functional structural bases of conditioned and unconditioned reflexes; Possible mathematical and simulation approaches for studying the functional mechanisms of physiological systems; Modeling of nervous activity; Physiology of the autonomic nervous system; Pharmacology of cholinergic drugs; Problems of neural tropics; Physiology of muscle contraction; Intracellular metabolism control; Physiology of the kidneys and of water salt metabolism; Problems relating to physiology of internal analyzers; Humoral link of interoceptive reactions; Physiology of hunger and thirst; Clinical physiology; Central controls of blood circulation; Physiology of blood coagulation; Physiology and pathology of the pancreatic gland; Physiological adaptation to heat, cold, high altitudes and desert conditions; Neurohumoral control of the reproductive function. **TAB**

N66-23048# Southwest Research Inst., San Antonio, Tex. **BIOASTRONAUTICS AND THE EXPLORATION OF SPACE** Theodore C. Bedwell, Jr. and Hubertus Strughold, ed. Dec. 1965 639 p refs. Proc. of the 3d Intern. Symp. held in San Antonio, 16-18 Nov. 1964 (Contract AF 41(609)-2293) (AD-627686) CFSTI: HC \$9.40/MF \$2.50

Symposium papers on bioastronautics and the exploration of space are presented. For individual titles see N66-23049-N66-23077.

N66-23054 National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PRIMORDIAL ORGANIC CHEMISTRY AND THE ORIGIN OF LIFE

Cyril Ponnamperna / In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 117-128 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

A group of exobiological experiments which were conducted to support the hypothesis of chemical evolution are described. The simple working hypothesis which was adopted is that the molecules which are fundamental now were fundamental at the time of the origin of life. Emphasis was placed on investigating the synthesis of the constituents of the nucleic acid and protein molecules. Primitive Earth conditions were simulated, the "primordial soup" described by Haldane was prepared, and a subsequent analysis was conducted. The results show that molecules of biological significance can be synthesized. The laboratory experiments point out that wherever the right conditions exist, those molecules which can act as precursors of biological systems will arise anywhere in the universe. The experiments thus lend support to the Oparin-Haldane hypothesis of chemical evolution, and the belief in the existence of extraterrestrial life. **C.T.C.**

N66-23055 Air Force Systems Command, Brooks AFB, Tex. Aerospace Medical Div.

THE HOSTILE KINETIC ENVIRONMENT ON SEA, ON LAND, IN THE AIR AND IN SPACE

John P. Stapp / In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 129-140 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

A discussion is presented of the hostile kinetic environment, with emphasis on bioastronautics and the exploration of space. Consideration is given to the earth's chemical

equilibrium, a brief theory of the origin of the earth, and the evolution of life. Various acceleration and deceleration experiments are cited, and results of human and chimpanzee exposures to rocket sled impact decelerations and wind blasts are tabulated. **C.T.C.**

N66-23056 National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

ORBITAL FLIGHT EXPERIENCES

M. Scott Carpenter / In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 141-148 (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

Orbital flight experiences which include brief discussions of astronomical phenomena, effects of zero gravity, nausea, problems with eating and drinking, pressure suits, and methods of making body measurements are related. A question-answer session of a particular manned space flight is included. **C.T.C.**

N66-23057 School of Aerospace Medicine, Brooks AFB, Tex.

SPACE OPHTHALMOLOGICAL PROBLEMS

William B. Clark and James F. Culver / In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 149-155 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

The visual problems of space flight are briefly discussed. The independence of vision in relation to some of the critical variables is shown, and injury susceptibilities to ultraviolet and infrared radiation are considered. The major conclusion is that the visual system is fully adequate for all presently planned space flights, and that no operational plans should be slowed or suspended for lack of information about the eyes. **C.T.C.**

N66-23058 Akademiya Meditsinskikh Nauk SSSR, Moscow. **OBSERVATION UNDER SPACEFLIGHT CONDITIONS: SOME RESULTS AND PROBLEMS [O NEKOTORYKH REZULTATAKH I PROBLEMAKH NABLYUDENIYA V USLOVIYAKH KOSMICHESKOGO POLETA]**

M. M. Kasenkov and A. P. Kuz'minov / In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 157-161 (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

A discussion is presented of ophthalmological experiments which were conducted to: (1) check the spectral sensitivity of the eyes under weightless conditions, (2) study visual acuity during injection into orbit and orbital flight, (3) determine man's ability to recognize various topographical features on earth, and (4) determine optimal lighting conditions inside a spacecraft cabin. These studies showed that during weightlessness spectral sensitivity is essentially equal to that measured on earth. None of the astronauts reported any abnormal phenomena. During special in-flight tests the astronauts did not hesitate in differentiating basic colors. In their observation of the earth's surface, the astronauts reported that the colors of the panorama did not change much from those observed from airplanes. **C.T.C.**

N66-23061 School of Aerospace Medicine, Brooks AFB, Tex.

EFFECT OF INERT GASES IN CABIN ATMOSPHERES

B. E. Welch and W. G. Robertson / In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 255-283 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

An evaluation of appropriate gaseous atmospheres for long duration manned space flight is presented. It is shown that ultimate decisions regarding spacecraft atmospheres are dependent upon engineering, physiologic, and mission requirements, and require a multidisciplinary approach. Consideration is given to such factors as mission duration, prospect of decompression, radiation profile, spacecraft leak rate, acceleration profile (both exit and entry), reliability, and system weight. Engineering constraints are considered, and include leakage from the spacecraft and control of the multigas atmosphere. Physiologic suitability of the proposed atmosphere includes evaluation of the inertness of the gases, atelectatic preventive qualities, relation to decompression, communication effects, respiratory function, and thermal properties. The diluent gases considered include nitrogen, helium, and neon with emphasis on the first two C.T.C.

N66-23062 School of Aerospace Medicine, Brooks AFB, Tex.

CONSIDERATIONS FOR RESEARCH ON CABIN ATMOSPHERES

Hans G. Clamann /In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 285-299 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

Various engineering constraints are considered for research with spacecraft atmospheres. The effects of gaseous ions on humans are discussed, with emphasis placed on the fire hazard associated with the mixtures. Experiments are cited in which the atmospheres were varied and the combustion characteristics observed. Special interest is directed toward the behavior of smoldering material since spacecraft fires may be predominantly caused by overheated parts of electric machinery. C.T.C.

N66-23063 Naval School of Aviation Medicine, Pensacola, Fla.

THE LABYRINTH AND SPACE FLIGHT

Ashton Graybiel /In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 301-339 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50 (NASA Order R-93)

This report discusses briefly some of the recent experimental findings which bear on the role of the otoliths and semicircular canals in a weightless vehicle or a rotating spacecraft in orbital flight. The individuality of these two organs is emphasized in these two different force environments, and reasons why this is the case are reviewed. Major areas covered include the labyrinthine functions, central nervous system connections, physiological and behavioral studies, mechanisms underlying habituation, susceptibility to canal sickness, and prolonged exposure in a rotating environment. Conclusions are that the purposeful role of the vestibular organs is overshadowed by their potentiality for causing severe functional disturbances. The individuality of the two vestibular organs is important inasmuch as their afferent messages not only carry different meanings in terms of gravito-inertial force, but also the message for the semicircular canals appears only when we rotate the head, while the message from the otolith organs is continuous. Other conclusions are that these differences in the two organs are exaggerated under conditions of weightlessness and in a rotating environment. C.T.C.

N66-23064 School of Aerospace Medicine, Brooks AFB, Tex.

CIRCULATORY ASPECTS OF MANNED SPACE FLIGHT

Lawrence E. Lamb /In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 343-356 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

This report deals with the apparent influence of weightlessness upon man's circulatory function. Consideration is given to the influence and absence of gravity; the influence of activity level; and studies involving chair rest, bed rest, and space cabin simulators. Observations made on the influence of the level of physical activity and other environmental factors upon the human body suggest the following areas for consideration in manned space flight: adequate physical exercise should increase the power requirement of the body, inducing favorable physiological responses commonly noted with adequate physical conditioning; venous occlusion and negative pressure mechanisms that produce alterations in distribution of blood volume and blood flow can influence vascular reflex mechanisms; and some form of artificial gravity may be utilized to provide a normal environment. C.T.C.

N66-23065 Academy of Sciences (USSR), Moscow.
MEDICAL INVESTIGATIONS ON SPACESHIPS "VOSTOK" AND "VOSKHOD"

O. Gazenko /In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 357-384 (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

This paper gives a brief review of medical and physiological experimental results obtained during manned flights of the Vostok and Voskhod spaceships from 1961 through 1964. The major problems studied include: (1) the influence of both individual and combined space flight factors upon physiologic functions as well as human adaptation processes involved, (2) effectiveness and reliability of life support systems, (3) man's proficiency and ability to perform tasks related to navigation, subsystem controls, and scientific equipment, (4) ways to increase human tolerance to space flight factors, and (5) evaluation of criteria and effectiveness of cosmonaut selection and training methods. Among the conclusions are that under relatively optimal conditions, physiologic reactions in space seem to be influenced mainly by psychologic stress and weightlessness. Acceleration plays a definite role at the beginning and end of flight. With the test methods used, no radiation effects were apparent. It is possible that the prolonged influence of weightlessness on cardiovascular tonus and regulation may lead to compensations in which tolerance to accelerations is lowered and adaptation even to a normal one-G environment is lost. C.T.C.

N66-23066 Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

BIODYNAMIC RESPONSE OF THE HUMAN BODY

Henning E. von Gierke /In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 385-411 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

The word biodynamics has evolved as the unifying term describing the dynamic mechanical properties of living systems and the effects of various mechanical force environments on these systems. The breakdown of the force environments into sustained acceleration, hypodynamics, impact, vibration, blast, acoustics, etc., has its justification more in historical reasons, simulation techniques, and practical requirements than in a basic systematic approach to the mechanisms involved. Notwithstanding obvious differences with respect to problems, techniques used, and some apparent differences in biological reactions to the various forms of mechanical energy, this paper reports and reviews results of recent studies emphasizing the common background and

the physical phenomena applying to the whole field. The status and value of mathematical models for studying the body's response to pressure (infrasonic noise, blast) as well as force changes (vibration, impact) are presented, and the practical application of such models for explaining physiological and pathological findings, for predicting the body's response to force environments not yet experienced, and for protection engineering and biomedical problems in general is discussed. Author

N66-23067 Southwest Research Inst., San Antonio, Tex.
MEN AND MACHINES: PERSPECTIVES FROM THE HISTORY OF FLIGHT
Martin Goland /In its Bioastronautics and the Exploration of Space Dec. 1965 p 413-422 (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

Perspectives and major accomplishments in the history of flight are presented. Included are fables and legends of the early periods, the development of machines in the 1800's, and achievements in the modern era. C.T.C.

N66-23068 Akademiya Meditsinskikh Nauk SSSR, Moscow.
BIOLOGIC INVESTIGATIONS ON SPACESHIPS "VOSTOK" AND "VOSKHOD" [BIOLOGICHESKIYE ISSLEDOVANIYA NA KOSMICHESKIKH KORABLYAKH "VOSTOK" I "VOSKHOD"]

V. V. Antipov /In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 435-452 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

Results of inflight biological tests carried out on Sputniks II through V and on the spaceships Vostok and Voskhod are reviewed. In addition, prospects for future biological experimentation during space flight are discussed. These experiments include the biologic influence of combined and individual flight factors, and such factors as weightlessness and cosmic radiation, singly and in combination with acceleration, vibration, and related parameters. C.T.C.

N66-23069 School of Aerospace Medicine, Brooks AFB, Tex.

CYTOKINETIC EFFECTS OF PROTON IRRADIATION

John E. Prince /In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 455-464 refs (See N66-23048 12-04)

(NASA Order R-84) CFSTI: HC \$9.40/MF \$2.50

The study approach is described in a program to investigate the effect of proton ionizing radiation on human cells. Since the low energy (<14 MeV) proton will be absorbed by the skin, biopsies of this tissue from irradiated laboratory animals are being cultured to determine cell survival and condition at dosages below and above the mean effective dose. Comparisons of living cells irradiated *in situ* with those irradiated in culture are being made with the information obtained from these experiments. The state of the art in radiologic physics, cell culture, microscopy, and photography permits observing the activity of individuals in a single layer of unstained living cells under proton bombardment. Using this type of instrumentation, studies to determine the effects of kinetic energy deposition in living cells of up to 10 million electron volts were initiated. These investigations are in partial support of experiments designed to determine the modifying effects of weightlessness on human cells in culture, combined with ambient space radiations. C.T.C.

N66-23070 Max-Planck-Institut für Verhaltensphysiologie, Seewiesen über Starnberg (West Germany).

SIGNIFICANCE OF CIRCADIAN RHYTHMS FOR SPACE FLIGHT

Juergen Aschoff /In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 465-484 refs (See N66-23048 12-04)

(Grant NsG-259-62) CFSTI: HC \$9.40/MF \$2.50

A discussion is given of the normal phase-relationship functions in the entrained organism and the significance of diurnal rhythms in sensory and motor performance. Also discussed are evidence for an endogenous rhythmicity in man, its characteristics and implications, and some of the problems of entrainment to unnatural Zeitgebers. Major topics considered include the phase map, self-sustained oscillation, conditions influencing frequency, internal desynchronization, the entrained circadian system, entrainment to a work-rest cycle, and features of entrainment. C.T.C.

N66-23071 Aerospace Medical Div. Aeromedical Research Lab. (6571st), Holloman AFB, N. Mex.

ANIMALS AS PRECURSORS TO MAN IN SPACE

Herbert H. Reynolds /In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 485-519 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

A review is presented of the animal's role as a precursor for man in space. Various experiments are reported both in the U.S. and in Russia, and future experiments utilizing animals are discussed. These include such areas as radiation studies, prolonged acceleration, the influence of coherent light radiation (laser) on the nervous system, and toxic hazards research. C.T.C.

N66-23072 American Astronautical Society, New York.
APPLICATIONS OF KNOWLEDGE RESULTING FROM BIOASTRONAUTIC ASPECTS OF THE SPACE EFFORT

Paul A. Campbell /In Southwest Res. Inst. Bioastronautics and the Exploration of Space Dec. 1965 p 521-534 refs (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

Space achievements resulting from serendipity are briefly discussed. Emphasis is placed on applications of aerospace medicine or bioastronautics, or which represent "spill overs" from the aerospace effort into medically oriented sciences. Consideration is given to such areas as electronic data processing and information retrieval, stress protection for astronauts, the telemetry of biomedical parameters, studies in water ecology, and protection against hazards of space radiations. C.T.C.

N66-23073 Air Force Flight Test Center, Edwards AFB, Calif.

THE X-15 PROGRAM

Charles E. Yeager /In Southwest Res. Inst. Bioastronautics and The Exploration of Space Dec. 1965 p 535-551 (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

A personal experience narration of films and photographs of test flights conducted in the X-15 program is presented. Background information starting with the X-1 is given, with emphasis placed on the need for safer pilot equipment throughout. C.T.C.

N66-23074 National Aeronautics and Space Administration, Manned Spacecraft Center, Houston, Tex.
PROJECT GEMINI MEDICAL ASPECTS

Charles A. Berry *In Southwest Res. Inst. Bioastronautics and the Exploration of Space* Dec. 1965 p 553-589 (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

Medical aspects are emphasized in a general discussion of the Gemini project. The objectives of the program are given along with mention of some of the technical capabilities. Consideration is given to such areas as diets, waste disposal, the pressure suit, flight schedules, abort operations, environmental control systems, food packaging, and medical sensors. C.T.C.

N66-23076 Air Force Systems Command, Brooks AFB, Tex

MANNED ORBITING LABORATORY: MEDICAL ASPECTS Andres I. Karstens *In Southwest Res. Inst. Bioastronautics and the Exploration of Space* Dec. 1965 p 603-612 (See N66-23048 12-04) CFSTI: HC \$9.40/MF \$2.50

General characteristics and constraints of the Manned Orbital Laboratory (MOL) system are discussed with emphasis on the medical aspects. The objectives and purpose of the MOL system are presented, and novel biomedical operations are defined. Life support system requirements are given, and include considerations of logistics, standard time-intensity environmental envelopes, environmental extremes, and the application of standards and engineering tradeoffs. Additional constraints considered include the effects of weightlessness and medical surveillance. C.T.C.

N66-23105# Aerospace Medical Div. Arctic Aeromedical Lab., Fort Wainwright, Alaska.

INFRARED THERMOGRAPHY OF SUBJECTS IN DIVERSE ENVIRONMENTS Technical Report, Jun. 1962-May 1963 James H. Veghte Dec. 1965 18 p refs (AAL-TR-65-18; AD-629348) CFSTI: HC \$1.00/MF \$0.50

Infrared thermograms were made with a scanning radiometer of 15 nude subjects exposed to environments of 4°C and 23°C for two hours and sweating subjects exposed to an environment of 27°C for 10 minutes. Surface temperatures of 41 different body areas were determined by relating calculated temperature values for a gray scale on each thermogram with densitometer readings. Surface temperatures were found to be more variable in the cold, 8°C to 15°C, with an average mean temperature of 11°C. The nose, pectoral area, patella, gluteus maximum and fatty tissue about the waist were cold regions whereas the upper chest, forehead and spinal column were warm regions. In a comfortable environment, the subjects' surface temperatures were less variable, 25°C to 29°C. Surface temperatures of subjects in comfort environments show similar differences between identical body regions as seen in the cold, but the magnitude of the temperature gradients was less. Sweating subjects had uniform surface temperatures, mean 33°C, with only small variations. These data were used to compare various methods for determining mean skin temperatures. Author (TAB)

N66-23109# Atomic Energy Commission, Washington, D. C. Division of Biology and Medicine.

LATE IRRADIATION EFFECTS CONFERENCE. INVENTORY OF CAPABILITY Summary of Proceedings Paul S. Henshaw, ed. May 1965 348 p refs Conf. held in Germantown, Md., 4-6 Dec. 1963 (WASH-1059; CONF-631203) CFSTI: HC \$7.00/MF \$1.50

The criteria used to define late irradiation effects, the characteristics of natural and radioinduced degenerative

changes in living systems, and the future direction of research in the field were discussed. Topics discussed in detail include the effects of radiation on the life span, on reproduction, on resistance to disease, on learning ability, on the nervous system, and on the incidence of neoplasia in mammals; manifestation of late radiation effects in tissues; manifestations of late radiation effects in microorganisms; manifestations of late radiation effects in cells; manifestations of late radiation effects at subcellular levels; the similarity of late irradiation effects and signs of aging; the effects of irradiation on the rate of degenerative changes; and the effects of prenatal irradiation on late life vigor. NSA

N66-23159# David Taylor Model Basin, Washington, D. C. Structural Mechanics Lab.

MAN'S RESPONSE TO SHIP SHOCK MOTIONS

Richard M. Mahone Jan. 1966 27 p refs (DTMB-2/35; AD-628891) CFSTI: HC \$2.00/MF \$0.50

Men were exposed in the laboratory to motions similar to those experienced on the decks of ships subjected to underwater explosion attack. From measurements of the gross bodily response of men, empirical equations are derived which can be used to compute the velocities at which man will leave the deck under various conditions. Tolerance curves are developed which permit an estimate of the shock level at which injury takes place. Author (TAB)

N66-23165# Hopital Henri Rousselle, Paris (France). Laboratoire de Neurophysiologie.

VISCERAL AFFERENT ACTIVITY EFFECTS ON BRAIN STEM RETICULAR FORMATION Final Technical Report, 1 Jul. 1964-30 Jun. 1965

P. C. Dell 1 Jul. 1965 16 p refs (Grant AF-EOAR-64-51)

(AFOSR-66-0180; AD-628298) CFSTI: HC \$1.60/MF \$0.50

There appears to be regional differences in the reticular core in the sense of a ventro-dorsal and caudo-rostral organization. These results are discussed in relation with histological data obtained by degeneration experiments and physiological results of intra-reticular stimulation or recordings with macro- and micro-electrodes. Special emphasis is put on the fact that the organization disclosed by these stimulation experiments shows good agreement with the distinction of reticular regions mainly occupied by long-exoned neurons (responsible therefore for short-lasting activations) and the ones mainly occupied by multi-synaptic short-axoned circuits whose role in the long-lasting delayed activation is stressed. Author (TAB)

N66-23209# Puerto Rico Nuclear Center, Mayaguez.

RESONANCE IN RADIATION EFFECTS Technical Report No. 2

Henry J. Gomberg, Robert A. Luse, Florencio Vasquez Martinez, Frank S. Koo, Rosa J. Santiago de Morales et al May 1964 42 p refs

(Contract AT(40-1)-1833)

(PRNC-40) CFSTI: HC \$2.00/MF \$0.50

A research program is being conducted on the X-ray effects on biological systems in the 5-20 kev energy range which contains the K-absorption edges of constituent atoms. Solutions of carboxypeptidase A were irradiated with collimated X-ray beams at 7.6, 8.68, and 9.69 kev; preliminary inactivation curves are given. Studies are being made on the X-ray-induced production of F centers at room temperature in alkali halide crystals, and some preliminary results for

KBr are described. Chromosomes labeled with 5-bromodeoxyuridine in onion root tips (*Allium cepa*) were irradiated by X-rays at energies near the K-absorption edges of Br, and chromosomal breakages per cell are given. The development of high-intensity field-emission X-ray sources is described. Other equipment are discussed: X-ray spectrometer, low-temperature irradiation chamber, and devices for F-center measurement. NSA

N66-23228# Oak Ridge National Lab., Tenn. Health Physics Div.

REDISPERSION OF SURFACE DUST IN A ROOM

G. W. Royster, Jr. and B. R. Fish 2 Aug. 1965 19 p refs (Contract W-7405-ENG-26)

(ORNL-TR-1209) CFSTI: HC \$1.00/MF \$0.50

Redispersion of deposited particulates from surfaces in a semi-isolated environment was studied with regard to the probability of a given particle population being resuspended by the movement of persons in the area. This information is related to the spread of biological contaminants in hospitals as well as to the maintenance of low dust levels in clean rooms. Copper oxide dust with a particle size range up to 5 μ was dispersed into a room and the concentration measured at intervals during settling. The deposition was then measured and compared with the redispersion concentration in the air as affected by various conditions of room ventilation and occupancy. Surface treatments, such as oiling the floors, are seen to enhance the retention of particles on surfaces. Jets of air impinging on the floor with a velocity of 80 meters per second remove 30 per cent of the total deposition on clean, waxed, asphalt tile floors and remove none of the deposit from the same floor covered with a thin oil coating. The degree of resuspension is directly related to the level of human activity in the contaminated area. Author (NSA)

N66-23244# Roscoe B. Jackson Memorial Lab., Bar Harbor, Maine.

GENETIC CONTROL OF AGING AND RADIATION-INDUCED LIFE SHORTENING IN MICE Progress Report, 1 Jan.-30 Sep. 1965

John B. Storer 30 Sep. 1965 9 p ref

(Contract AT(30-1)-3314)

(NYO-3314-2) CFSTI: HC \$1.00/MF \$0.50

Progress is reported in studies of the natural rate of aging of mice, the effects of various doses of X-radiation on the life span of mice, the rate of accumulation of mutations with age, and the effects of mouse strains on sensitivity to radioinduced mutations. Results are included from studies of the incidence of chromosome aberrations in regenerating liver of several mouse strains with increasing age, strain differences in the incidence of lethal mutations in spermatozoa with increasing age, the effects of 200 R X-radiation on the incidence of chromosome aberrations in regenerating liver of mice of different strains, and the effects of exposure of male mice to 600 R X-radiation on the viability of embryos produced following mating to females of similar or different strains. NSA

N66-23292# Brussels Univ. (Belgium).

RESEARCH INTO NEW MEANS OF DIAGNOSIS AND TREATMENT BY METHODS DERIVED FROM NUCLEAR TECHNIQUES Annual Report, 1963 [RICERCA DI NUOVI METODI DIAGNOSTICI E TERAPEUTICI DERIVATI DA TECNICHE NUCLEARI Relazione Annuale, 1963]

1965 48 p refs In FRENCH and ITALIAN Prepared jointly with Pisa Univ.

(Contract EURATOM-026-63-4 BIAC)

(EUR-2414.f.i)

Results of research and planning are described for: analog models of the metabolism of phospholipides and proteins; a clinical absorption test on ^{125}I and ^{131}I labeled fats; a routine method for the external measuring of renal excretion with ^{125}I hippurane; two methods for the measurement of the coronary flow using external and internal counting (^{85}Rb , ^{87}Kr); a method for measuring the cerebral circulation (^{85}Kr); a method for the detection of cancers and cancerous metastases by external counting (^{131}I Fibrinogen); a method for measuring *in vitro* glucosated catabolism (^{14}C glucose); methods for dosing erythropoietin, insulin, and thyrotropic hormone; the use of double labeling with ^{125}I and ^{131}I and isotopic equilibrium in the diagnosis of thyroid disorders; and neutron activation dosing of urinary, plasmatic, and thyroidal iodine and tissue ions in muscular biopsies. The projects commenced include: development of a high-sensitivity whole-body radioactivity counter for high-speed measurements; and studies on the origin of anemia in radiation sickness. NSA

N66-23304# Commissariat a l'Energie Atomique, Grenoble (France), Service Radio-Biologie.

THE EFFECT OF FRACTIONATING 100 R HARD X-RAY DOSES ON THE HEMOGRAM AND PROTEINOGRAM OF THE RABBIT [ACTION DU FRACTIONNEMENT DE 100 R DE RAYONS X SUR L'HEMOGRAMME ET LE PROTEINOGRAMME DU LAPIN]

Denise Alix Sep. 1965 22 p refs In FRENCH

(CEA-R-2865)

Eighty-one rabbits received total exposure of 50 to 200 R X-rays, by fractional doses of 5, 10, 25, 50 and 100 R per irradiation. Blood count and blood protein content were determined before, during, and after the irradiation time. Seventeen controls were subjected to the same investigations with the same periodicity. Statistical analysis of experimental data indicated that irradiation induces drop in the leukocyte count, resulting from a drop in mononuclear cells. It is more difficult to determine its action on the protein profiles because the observed changes were likewise observed on the controls, although at a lesser degree. Results indicated an increase of albumin concentration and some instability of the γ -globulins concentration. The possible mechanisms of X-rays effects including perturbations of protein metabolism following loss of mitotic activity and histolysis are discussed. Author (NSA)

N66-23307# Brandeis Univ., Waltham, Mass. Graduate Dept. of Biochemistry.

THE MOLECULAR BASIS FOR THE MUTAGENIC AND LETHAL EFFECTS OF ULTRAVIOLET IRRADIATION Progress Report, 1 Sep. 1964-30 Jun. 1965

Lawrence Grossman [1965] 3 p ref

(Contract AT(30-1)-3449)

(TID-22039) CFSTI: HC \$1.00/MF \$0.50

Progress is reported in studies of the molecular basis for the mutagenic and lethal effects of ultraviolet radiation. Data are included from studies of the effects of ultraviolet radiation on polynucleotide templates for RNA polymerase of *Micrococcus lysodeikticus*; the mutagenic effects of hydroxylamine; and the effects of ultraviolet radiation on the templating properties of polyuridylic acid of *M. lysodeikticus* NSA

***N66-23336#** Brookhaven National Lab., Upton, N. Y.
THE ROLE OF SOMATIC MUTATIONS IN AGING
 Howard J. Curtis [1965] 23 p. refs. Presented at Symp. on Topics in the Biol. of Aging, La Jolla, Calif.
 (Contract AT(30-2)-GEN-16)

(BNL-9653: CONF-651116-1) CFSTI: HC \$1.00/MF \$0.50

A review is presented on aging in mammals. Cellular aging, mutations and aging, radiations and aging, and actions of mutations are discussed. There is a good deal of evidence indicating that mutations play a dominant role in mammalian aging, and the concept correlated very well with most of the known facts of aging. NSA

N66-23359# Toegepast Natuurwetenschappelijk Onderzoek, Rijswijk (Netherlands).

BONE MARROW TRANSPLANTATION IN IRRADIATED ANIMALS. PRODUCTION AND APPLICATION OF PATHOGEN FREE ANIMALS IN RADIATION EXPERIMENT
 Annual Report, 1964

15 Jul. 1965 10 p. refs
 (EURATOM-029-63-1 BIAN)

Results are given on fetal hemopoietic grafts in monkeys, selective elimination of immunologically active cells in the graft, the pooling of bone marrow from different donors, the modification of secondary disease following foreign bone marrow transplantation, the prevention of secondary disease, the selection of compatible donors, and fundamental work on tissue transplantation. A description of the progress achieved in the field of production and evaluation of pathogen free animals and gnotobionts in radiation research is also included. Author (NSA)

N66-23402# Pillsbury Mills, Inc., Minneapolis, Minn.
ALL PURPOSE MATRICES FOR COMPRESSED FOOD BARS

Jack R. Durst. Natick, Mass., Army Natick Labs., Jan. 1966, 149 p
 (Contract DA-19-129-AMC-2103)

(TR-66-1-FD: AD-628377) CFSTI: HC \$4.00/MF \$1.00

Edible binders were developed which impart favorable physical properties including cohesiveness to compressed dry foods representing a broad range of chemical compositions. Further experimental effort yielded binders for compressed foods which can also be rehydrated to yield a familiar meal item, such as casseroles, creamed soups, puddings, thin soups and beverages. These binders do not significantly alter the storage stability of the basic food components.

Author (TAB)

N66-23461*# National Aeronautics and Space Administration, Washington, D. C.

AEROSPACE MEDICINE AND BIOLOGY—A CONTINUING BIBLIOGRAPHY

Mar. 1966 176 p

(NASA-SP-7011(22) CFSTI: HC \$1.00/MF \$1.00 CSCL 06

Abstracted data are presented on studies dealing with the biological, physiological, psychological, and environmental effects on man during and after simulated or actual flight in the earth's atmosphere or in interplanetary space. Similar studies on biological organisms of lower order are included, along with such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors. Subject, corporate source, and personal author indexes are also listed. M.G.J.

N66-23480# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

REACTION CHARACTERISTICS OF THE HEMOGENIC SYSTEM IN THE PERIOD OF RESTORING ITS FUNCTIONS AFTER RADIATION AFFLICTION

I. M. Shur'yan, V. V. Andryushchenko, and G. M. Rekun 20 Sep. 1965 13 p. Transl. into ENGLISH from Vosstanov. Protsessy Pri Radiats. Porazheniyakh Sb. Statey (USSR), 1964 p 164-171

(FTD-TT-65-655/1+2+4: AD-622469) CFSTI: HC \$1.00/MF \$0.50

Reactions of the hemotologic system of rabbits to internal (beta rays of radioactive phosphorous P32) and external (X-ray) radiation were investigated. Both types of ionizing radiation were used in biologically equivalent dosages. Hematological studies of the peripheral blood included the percentage content of hemoglobin, the number of erythrocytes, the content of reticulocytes and thrombocytes, the total number of leukocytes, and the leukocytic formula. Sternum punctations and myelograms were used to study the bone marrow. The course of radiation illness, survival, and weight was clinically observed. The findings are discussed and it is pointed out that the period of reduced resistance and weakening of protective properties of the organism after external irradiation is considerably shorter than after internal irradiation. Electromicroscopic investigations were also made of the ultrastructure of the bone marrow of rats subjected to X-ray dosages of 500 r. Results indicate peculiarities in the normal structure of plasmonic cells, and a slow revivification in comparison with other hemogenic elements. M.G.J.

N66-23482# York Univ., Toronto (Ontario). Molecular Psychobiology Lab.

NUCLEIC ACID AND PROTEIN CHANGES DURING DEVELOPMENT IN NORMAL AND VISUALLY DEPRIVED RATS

John Gaito, James Mottin, and Kenneth Koffer 18 Jan. 1966 24 p

(Contract Nonr-4935(00); Grant NRC APA-122)

(MPL-3: AD-628311) CFSTI: HC \$2.60/MF \$0.50

A two stage experiment concerned with the neurochemical effects of visual deprivation was conducted. In Stage 1 rats were enucleated at 15 days of age and sacrificed at either 30, 50, 75, or 100 days. Stage 2 research involved removing the eyes at 100 days and sacrificing at 115, 135, 160, or 185 days of age. A littermate normal was housed with each enucleate. No differences were present in the visual cortex in Stage 1 but the control animals had greater protein values and RNA/DNA and protein/DNA ratios in Stage 2. Several other significant results occurred and are discussed. The period of greatest cellular activity was at 50 days or 75 days in all tissues. Author (TAB)

N66-23488*# Harvard School of Public Health, Boston, Mass.
STUDY OF SPACE CABIN ATMOSPHERES Semiannual Status Report, 1 Jul.-31 Dec. 1965

William A. Burgess 20 Apr. 1966 8 p

(Grant NGR-22-007-053)

(NASA-CR-74436) CFSTI: HC \$1.00/MF \$0.50 CSCL 06K

During this period consultations were held on the design of an in-flight space cabin aerosol sampling instrument. The major topics covered are described briefly. The design of a field aerosol generator for calibrating the aerosol particle analyzer was initiated. A survey is being conducted on various particle counter designs. R.N.A.

N66-23495*# Space/Defense Corp., Birmingham, Mich.
[DEVELOPMENT OF TWO RESPIROMETER SYSTEMS FOR USE IN THE CONDUCT OF CIRCADIAN RHYTHM STUDIES IN SPACE] Technical Status Report, 4 Nov. 1965-4 Feb. 1966

Donald L. Foster 23 Feb. 1966 22 p
 (Contract NASw-870)

(NASA-CR-74156; TR66-102) CFSTI: HC \$1.00/MF \$0.50 CSCL 06B

Work is continuing on the development of two respirometer systems for use in the conduct of circadian rhythm studies in space. These are a system for use with a single specimen of the potato tuber, and a system using up to 12 specimens of this organism. During this period effort was directed to the conduct of functional performance evaluation tests of the single cell system, and to the design and fabrication of an engineering model of the multicell system. Results are encouraging in that the single cell system appears to be performing well, while providing a resolution of the oxidative metabolism which is potentially much greater than anticipated. The design and development of the multicell system has proceeded to the fabrication stage of the engineering model of this unit, which is nearly 50% complete. R.N.A.

N66-23498*# Naval School of Aviation Medicine, Pensacola, Fla.

OTOLITH SHEAR AND THE VISUAL PERCEPTION OF FORCE DIRECTION: DISCREPANCIES AND A PROPOSED RESOLUTION

Manning J. Correia, W. Carroll Hixson, and Jorma I. Niven 1 Dec. 1965 82 p refs Joint Rept. with NASA /ts Rept.-126 (NASA Order R-93)

(NASA-CR-74095; NAMI-951) CFSTI: HC \$3.00/MF \$0.75 CSCL 05H

Judgments of subjective vertical and horizon were obtained during exposure to five angular directions and five magnitudes of linear acceleration stimuli varied independently on a human centrifuge. The visual perception of the orientation of the force field could not be shown to be a linear function of the otolith shear-directed component, and discontinuities in response for identical stimuli were observed. A tangent equation expression which resolves these discrepancies and better predicts the subjective response is proposed. A rationale for this equation and generalizations relative to extraterrestrial environments are discussed. Author

N66-23521*# California Univ., Berkeley. Dept. of Chemistry.

REPETITIONS IN THE POLYPEPTIDE SEQUENCE OF CYTOCHROMES

Charles R. Cantor and Thomas H. Jukes [1966] 9 p refs (Grant NsG-479)

(NASA-CR-74433) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

Protein evolution from peptides and gene duplications and deletions in polypeptide sequences are reviewed. It is reported that proteins may have evolved from comparatively short primordial peptides by processes of duplication, deletions, and amino acid substitutions. Gene duplications and deletions as translations of genetic message in polypeptide sequences of proteins are discussed. Examples are given in the α and β chains of hemoglobin A. Examination of polypeptide chains for regions of partial internal gene duplication are mentioned. A study of the primary structure of the cytochromes C indicated a region of partial duplication in the cytochrome C of *Neurospora crassa*. N.E.N.

N66-23522*# Mayo Clinic, Rochester, Minn.

STUDIES OF THE EFFECTS OF ACCELERATION ON CARDIOVASCULAR AND RESPIRATORY DYNAMICS
 Semiannual Status Report, 1 Oct. 1965-1 Apr. 1966

Earl H. Wood 31 Mar. 1966 14 p

(Grant NsG-327)

(NASA-CR-74432) CFSTI: HC \$1.00/MF \$0.50 CSCL 06S

Acceleration effects on pulmonary arterial-venous shunting and pleural and pericardial pressure measurements during acceleration are reported. The decrease in arterial blood oxygen saturation during and after transverse acceleration was measured in anesthetized dogs exposed to 2, 4, and 6 G. It was concluded that little or no arterial-venous shunting occurs through superior regions of the lungs but that there was arterial-venous shunting past atelectatic areas of the dependent lung. Plastic casts were made for individual chimpanzee support in the prone and supine positions during exposures to 6 G. Endotracheal tube, aortic, pulmonary artery, right atrial, dorsal and ventral right pleural and left pleural, and esophageal pressures were recorded continuously. Preliminary analysis of the data indicates that the changes in oxygen saturation caused by acceleration are similar to those previously demonstrated in man and dogs. The development of on-line time-sharing electronic data processing and computer analysis techniques are discussed. N.E.N.

N66-23523*# Texas Univ., Austin. Defense Research Lab.

[CONDUCT STUDIES OF AUDITORY INFORMATION PROCESSING EMPHASIZING THE APPLICATION OF SIGNAL DETECTABILITY THEORY TO THE AUDITORY SENSORY RESPONSES] Seventh Quarterly Progress Report, 1 Dec. 1965-28 Feb. 1966

21 Apr. 1966 9 p

(NASA Order R-129; Contract Nonr-3579(04))

(NASA-CR-74424) CFSTI: HC \$1.00/MF \$0.50 CSCL 05H

In the course of vigilance studies, a modified version of the method of free response was employed. The type of detection performance exhibited by the subjects when the stimulus occurred infrequently and without warning was simulated closely using an electronic model of the hearing mechanism. Data were collected in three variations of an experiment designed to assess the effects of adaptation on the brightness of flashed and incremental and decremental stimuli. Emphasis was placed on examining the dependence of the slope of the brightness function upon adaptation condition; preliminary analysis indicated that the slope of the obtained functions are considerably steeper than those reported previously. Work was also continued on signal detection and the width of critical bands, and psychometric functions for an ear model—effects of duration. D.T.

N66-23524*# California Univ., Berkeley.

STUDIES OF NUCLEOTIDE SEQUENCES IN TMV-RNA. II: THE ACTION OF SPLEEN DIESTERASE

B. Singer, M. Sherwood, and A. Fraenkel-Conrat [1965] 9 p refs

(Grants NsG-479; NSF GB-3107)

(NASA-CR-74423) CFSTI: HC \$1.00/MF \$0.50 CSCL 06P

The use of spleen diesterase to obtain information on polynucleotides at the 3'-linked (left) end of the chain, and its essentiality for the infectivity of RNA are reviewed. The methods used are outlined and the materials described. Among the findings were the following: (1) Limited digestion of TMV-RNA caused the release of a consistent pattern of nucleotides (2) The infectivity of treated preparations decreased rapidly with first order kinetics. (3) Prolonged treatment or greater amounts of enzyme caused disappearance

of the 30 S material and the appearance of appreciable amounts of the cyclic 2',3'-nucleotides. A previous conclusion that TMV-RNA carries no 5'-terminal phosphate was confirmed.

N.E.N.

N66-23543* # National Aeronautics and Space Administration, Washington, D. C.

CIRCULAR DICHROISM AND SEQUENCE OF NUCLEOTIDES IN NUCLEIC ACIDS [TSIRKULYARNYY DIKHOIZM I POSLEDOVATEL'NOST' NUKLEOTIDOV V NUKLEINOVYKH KISLOTAKH]

G. B. Zavit'skiy, T. V. Venkstern, and A. A. Bayev Mar. 1966 15 p refs Transl. into ENGLISH from Dokl. Akad. Nauk SSSR (Moscow), v. 166, no. 4, 1966 p 978-981 (NASA-TT-F-10049) CFSTI: HC \$1.00/MF \$0.50 CSCL 06B

This article proposes to use circular dichroism to determine the order of the bases in oligonucleotides, and finds that this method is effective.

Author

N66-23545* # National Aeronautics and Space Administration, Washington, D. C.

EXOBIOLICAL STUDIES OF INTERPLANETARY SPACE AND UPPER ATMOSPHERIC LAYERS [KOSMOBIOLOGISCHE UNTERSUCHUNGEN DES INTERPLANETAREN RAUMES UND HOCHATMOSPHARISCHER SCHICHTEN]

Konstantin Tzonis Apr. 1966 9 p Transl. into ENGLISH of a RUSSIAN paper presented at the Intern. Astronautical Federation, 16th Intern. Astronautical Cong., Athens, 13-18 Sep. 1965

(NASA-TT-F-10055) CFSTI: HC \$1.00/MF \$0.50 CSCL 06F

The author suggests a means of determining whether living organisms exist in interplanetary space or in the upper layers of the atmosphere. An apparatus, called a "biosyllectus" from the Greek bios-life and syllegein-collect), for collecting such microorganisms is described.

Author

N66-23547* # National Aeronautics and Space Administration, Washington, D. C.

METHOD FOR DETERMINING PULSE WAVE VELOCITY [K METODIKE OPREDELENIYA SKOROSTI PUL'SOVOY VOLNY]

I. M. Kayevitser Apr. 1966 10 p refs Transl. into ENGLISH from Klin. Med. (USSR), v. 36, 1958 p 142-144

(NASA-TT-F-100464) CFSTI: HC \$1.00/MF \$0.50 CSCL 06B

Determination of pulse wave velocity is regarded as a very promising method for diagnosing arteriosclerosis. The author describes a new method for calculating pulse wave velocity by means of a cardiograph. Results obtained by this method coincide with data given in the literature.

H.S.W.

N66-23571# Naval Radiological Defense Lab., San Francisco, Calif.

THE EFFECTS OF VARIOUS GASES WITHIN THE NASAL CAVITIES OF RATS ON THE RESPONSE OF OLFACTORY BULB NEURONS TO X-IRRADIATION

Gary P. Cooper, Donald J. Kimeldorf, and G. C. Mc Corley 22 Dec. 1965 21 p refs

(USNRDL-TR-958; AD-628443) CFSTI: HC \$2.60/MF \$0.50

Extracellular microelectrode recordings were made from single neurons of the olfactory bulb in anesthetized tracheotomized rats. Air, oxygen, argon, and nitrogen were perfused through the nasal cavities in order to determine whether the response of olfactory bulb neurons to X-rays was dependent

on the particular gas present within the nasal cavities. Head-only X-irradiation (250 KVP, 100 R/minute) produced responses in many neurons during the perfusion of all four gases used. Such responses were ordinarily depressed, however, during argon or nitrogen perfusion as compared with the responses obtained during air or oxygen perfusion. In some cases, argon and nitrogen abolished the response to radiation within 5 minutes. It was concluded that the response of olfactory bulb neurons to X-rays was not dependent on the presence within the nasal cavities of any of the gases used. It was also concluded that the response of olfactory bulb neurons to X-irradiation depends upon an effect on olfactory receptors, since the response could be modified in most cases by the perfusion of argon and nitrogen.

Author (TAB)

N66-23574# National Jewish Hospital, Denver, Colo.

LACTIC ACID, FITNESS AND ALTITUDE Progress Report

Cutting B. Favour Feb. 1966 39 p refs

(Contract DA-79-193-MD-2446)

(AD-628713) CFSTI: HC \$2.00/MF \$0.50

Healthy young men acclimatized to 5,300 feet and in a sedentary state were assembled in the spring of 1963, 1964 and 1965 for a two-variable four-part study of the effect of physical fitness on acute exposure to one week's residence at 14,150 feet. In part one, the subjects underwent a battery of tests of ambient altitude. In part two, immediately thereafter, these tests were repeated at 14,150 feet. The subjects then returned to ambient altitude where they spent 4-5 weeks in a physical conditioning program. In part three, the test battery was repeated at the end of the fitness program and in part four, another week of tests at 14,150 feet was completed. These studies indicate that a month of physical training significantly lowers both the resting and exercise arterial blood lactic acid level using a bicycle ergometer work load at 600 Kg m/min. Exposure to altitude raised resting and exercise HLA levels in the sedentary state but did not alter the lowered values of the fit state. Fitness also prevented at altitude the hyperventilation and increased oxygen consumption seen in the second 5 minutes of the 10 minute work period in the sedentary state. A number of hematological, blood gas and electrolyte responses to exercise and to altitude were not altered by becoming fit. Subjects in the fit state were less symptomatic and more effective in technical duties at altitude than when in a sedentary state.

Author (TAB)

N66-23611* # National Aeronautics and Space Administration, Washington, D. C.

THE INFLUENCE OF ELECTROSLEEP ON THE THERMOREGULATION REFLEX AND ELECTRIC RESISTANCE OF THE SKIN IN PATIENTS WITH PRURITIC DERMATOSIS [VLIYANIYE ELEKTROSNA NA TERMOREGULYATSIONNYY REFLEKS I ELEKTROSOPROTVLENIYE KOZH I U BOL'NYKH ZUDYASHCHIMI DERMATOZAMI]

L. D. Butovetsky Apr. 1966 12 p refs Transl. into ENGLISH from RUSSIAN

(NASA-TT-F-10091) CFSTI: HC \$1.00/MF \$0.50 CSCL 06E

Based upon investigations of 29 patients suffering from eczema, it is concluded that in the majority of cases with eczema the thermoregulation reflex is impaired. Normalization of the reflex, which coincides with the improvement of the skin process, is observed in a number of patients under the influence of electrosleep. In the majority of eczema cases, the electric resistance of the skin is reduced and does not undergo any essential change as the result of electrosleep.

Author

N66-23620* Aeronutronic, Newport Beach, Calif.

EXPERIMENTAL STUDIES FOR THE DETECTION OF PROTEIN IN TRACE AMOUNTS

E. R. Walwick and B. R. Zalite Washington, NASA, May 1966 83 p refs

(Contract NASw-770)

(NASA-CR-466) CFSTI: HC \$3.00/MF \$0.75 CSCL 06A

Further research is presented on a program to demonstrate the utility of the dye, 4,5,4',5'-dibenzo-3,3'-diethyl-9-methylthiacarbocyanine, for the detection of biological macromolecules. Analysis of stoichiometry studies on the reaction of the dye with various macromolecules were carried out and they indicate that for optimal reaction a one to one ratio of dye to anion site on the polymer is generally required to form the various complex states. These states correspond roughly with spectral band maxima at 570, 535, 510, 650 and 470 mμ. Titration of materials giving a J-band (650 mμ peak) indicated that this state arises through reaction of individual dye molecules with particular sites as a function of dye configuration and conformation to the site rather than being due to dye-dye interaction in a very large aggregate of dye molecules as previously supposed. Results from reaction of the dye with soil extracts are presented. Inorganic ions and aluminosilicate minerals which might interfere with the dye reaction were investigated and procedures were developed to circumvent interference. Author

N66-23622* National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

INVOLUNTARY HYPOHYDRATION IN MAN AND ANIMALS: A REVIEW

John E. Greenleaf Washington, NASA, 1966 38 p refs (NASA-SP-110) GPO: HC \$0.30; CFSTI: MF \$0.50 CSCL 06P

A review is presented of literature pertaining to the delay in rehydration following water loss and other associated factors influencing drinking in man and in other animals. While most animals rehydrate rapidly, the rat and man do not. Man takes over 72 hours to regain a water deficit of 6% of his body weight, while animals can do it in an hour or less. Water intake in man is not proportional to the total volume of body water. Man regains lost water at a constant rate regardless of the water deficit level or whether lost by deprivation or sweating. Man does not gulp water to restore the deficit as in animals, but instead will drink rapidly about 1 liter of water and stop. If water is forced beyond this point, vomiting usually ensues. Factors affecting drinking include body water volume, osmotic concentration, gastrointestinal absorption rates and stretch receptors, food and salt ingestion, starvation, environmental temperature and humidity, physical exercise, and psychological and social parameters. Attempts to explain drinking on the basis of a single variable have been unsuccessful. R.N.A.

N66-23632* Aerospace Medical Div. Aerospace Medical Research Labs. (6570th), Wright-Patterson AFB, Ohio.

BASIC HUMAN FACTORS TASK DATA RELATIONSHIPS IN AEROSPACE SYSTEM DESIGN AND DEVELOPMENT Final Report, Aug.-Dec. 1965

L. Duncan Hannah and Lawrence E. Reed (Am. Inst. for Res.) Dec. 1965 92 p refs

(NASA Order R-90)

(NASA-CR-74374; AMRL-TR-65-231) CFSTI: HC \$3.00/MF \$0.75 CSCL 05E

The generation, use, and flow of human factors task data in aerospace system design and development are described. The data are characterized by a process of continual transformation in content and form of presentation occurring

throughout the iterative cycles of system development. The networks within which data flow are shown to be extensive in size, pervasive in nature, and complex in their dynamic relationships. These dynamic processes are illustrated in flow diagrams showing the relationships of human factors task data and their input/output elements in functional analysis for planning, specifications, task analysis, human engineering, reliability, maintainability, qualitative and quantitative personnel requirements information, training equipment planning information, and maintenance manuals. Author

N66-23657* Ohio State Univ. Research Foundation, Columbus. Environmental Medicine Lab.

CARDIOVASCULAR EFFECTS OF VIBRATION Semiannual Report, 1 Aug. 1965-28 Feb. 1966

Lester B. Roberts and John H. Dines 13 Mar. 1966 16 p refs (Grant NGR-36-008-041)

(NASA-CR-74439) CFSTI: HC \$1.00/MF \$0.50 CSCL 06E

Anesthetized dogs were investigated for vibration induced increase in heart rates and its causative mechanism either from baroreceptors, the cardiac center, or the heart itself. Left ventricular pressure and cardiac outputs were measured together with the mean arterial blood pressure from the thoracic aorta. It was found that transient tachycardia brought about by vibration was accompanied by a drop in peripheral vascular resistance and an increase in cardiac output. Administration of propranolol did not effect the transient changes markedly. However, atropine abolished vibration induced tachycardia, both when given alone or after propranolol, with arterial blood pressure fall within 30 seconds of the onset of vibrations. It was concluded that sympathetic activity to the heart was not stimulated by vibration. G.G.

N66-23679* Magna Corp., Anaheim, Calif. Research and Development Div.

RESEARCH ON APPLIED BIOELECTROCHEMISTRY First Quarterly Progress Report, 14 Mar.-30 Jun. 1963

J. H. Canfield, B. H. Goldner, and R. Lutwack [1963] 71 p refs /Its Rept. 314/7014/T3

(Contract NASw-623)

(NASA-CR-71834) CFSTI: HC \$3.00/MF \$0.75 CSCL 06M

The utilization of human feces and urine as electrochemical fuels is investigated, five organisms in urea bacteria have been studied, and a limited effort has been made in screening for fecal degradation. A literature search for microorganisms and enzymes useable for (1) the production of hydrogen and ammonia from urine and feces and (2) the conversion of these wastes into chemicals reusable in a closed environment was completed. This review resulted in the selection of organisms and enzymes for screening and further study. When five organisms in urea bacteria were investigated, only the *Bacillus pasteurii* met the criterion of anaerobic growth and hydrolysis of urea in urine. It is considered inconsistent to attempt optimum utilization of human wastes both for electrochemical fuel and for conversion to reusable chemicals, and a tentative decision has been made to optimize primarily for utilization of these materials as fuels. Electrochemical evaluation of urine is under way. M.W.R.

N66-23687# Institut Royal Meteorologique de Belgique, Brussels.

INCIDENCE OF THE METEOROLOGICAL CONDITIONS ON THE MICROBIOLOGICAL POLLUTION OF THE ATMOSPHERE AT LIEGE [INCIDENCE DES CONDITIONS METEOROLOGIQUES SUR LA POLLUTION MICROBIOLOGIQUE DE L'ATMOSPHERE LIEGEOISE]

J. Gerardy and J. Grandjean 1966 20 p refs In FRENCH /Its Publ. Ser. 8, No. 47

CFSTI: HC \$1.00/MF \$0.50

Microbe gathering in masses of unstable air is on the average two times higher than that in masses of stable air. In stable air the germ count appears not to be affected by temperature, humidity or wind conditions; on the contrary, in unstable air, higher counts are associated with high temperatures, relatively low humidity and strong or moderate winds while lower counts are noted for lower temperatures, high humidities and weak winds or the absence of winds.

Transl by R.L.

N66-23709*# Northrop Space Labs., Hawthorne, Calif.
INVESTIGATION OF PEROGNATHUS AS AN EXPERIMENTAL ORGANISM FOR RESEARCH IN SPACE BIOLOGY Progress Report, 1 Jan.-31 Mar. 1966

R. G. Lindberg [1966] 39 p refs

(Contract NASw-812)

(NASA-CR-74115; NSL-64-29-10) CFSTI: HC \$2.00/MF \$0.50 CSCL 06F

The hibernation characteristics of pocket mice were studied to determine whether there is a seasonal factor influencing the torpidity pattern of pocket mice, and to determine whether their torpidity is comparable to the hibernation phenomenon of the classical hibernators. Preliminary findings indicate that the pocket mouse does behave as a classical hibernator and there may be a seasonal rhythm in the torpidity pattern. The arousal pattern and simultaneous peripheral vasoconstriction observed in these mice confirmed the hypothesis that the organism has the same types of physiological mechanisms observed in true hibernators. Additional studies were conducted to document the metabolic rhythm of torpor and activity under conditions more closely resembling those found in nature. Mice were maintained in the dark at 22°C, 10°C and 5°C, for three weeks at each temperature level. Data from these experiments is presented and the effects of temperature on torpidity are summarized.

H.S.W.

N66-23716*# ACF Industries, Inc., Riverdale, Md. Electronics Div.

INTERRELATIONSHIPS BETWEEN TRACKING PERFORMANCE MEASURES, CONTROL DYNAMICS, AND THE EFFECTS OF INCENTIVES

Roland H. Tanck and Horace F. Stokes, Jr. Oct. 1963 36 p refs /Its Rept.-8108-134

(Contract NASw-545)

(NASA-CR-74175) CFSTI: HC \$2.00/MF \$0.50 CSCL 05H

A study was conducted to determine the relative sensitivity of seven commonly used measures of tracking performance to the effects of changes in motivation. Data, collected on 36 subjects, is presented on a series of compensatory tasks involving three types of control dynamics. Five subjects were in the control group and 31 in the experimental group. After a period of practice, a base measure of performance was established for all subjects. The control group repeated their tasks as before while the experimental group was promised a monetary reward for any increase in time on target scores on subsequent trials. Two of the results reported are: (1) The control

group measures showed no significant changes in their final trials while the experimental group scores changes significantly for all measures except root mean square error. (2) Time over target and average absolute error showed the most significant and consistent changes when incentives were introduced.

H.S.W.

N66-23758*# National Biomedical Research Foundation, Silver Spring, Md.

EVOLUTION OF THE STRUCTURE OF FERREDOXIN BASED ON SURVIVING RELICS OF PRIMITIVE AMINO ACID SEQUENCES

Richard V. Eck and Margaret O. Dayhoff [1965] 20 p refs (Contract NSR-21-003-002; Grants NIH GM-12168; NIH GM-08710)

(NASA-CR-74268; NBR-660101-20878) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

The present-day structure of ferredoxin, with its simple, inorganic active site and its functions basic to photon-energy utilization, suggests the incorporation of its prototype into metabolism very early during biochemical evolution, even before complex proteins and the complete modern genetic code existed. The information in the amino acid sequence of ferredoxin enables us to reconstruct its evolutionary history. It has evolved by doubling a shorter protein, which may have contained only eight of the simplest amino acids. This shorter ancestor in turn developed from a repeating sequence of the amino acids alanine, aspartic acid or proline, serine, and glycine. The living relics of this primordial structure persist today because of a conservative principle in evolutionary biochemistry: *Natural selection inhibits with extreme severity any change in a well-adapted system on which several other essential components depend.* Many such intricate details of the earliest stages of life must still survive, awaiting detection and elucidation.

Author

N66-23787*# Ball Bros. Research Corp., Boulder, Colo.
ENGINEERING BREADBOARD MODEL, WOLF TRAP MICROBE DETECTION DEVICE Final Report

D. E. Buckendahl, L. Ried, Jr., and E. Lemberg 8 Sep. 1965 55 p refs Prepared for Rochester Univ.

(Grant NSG-209)

(NASA-CR-74214; F65-6) CFSTI: HC \$3.00/MF \$0.50 CSCL 06B

An experimental microorganism detection device, intended eventually for a Mars landing, is described. The breadboard model optically monitors organism growth in an enrichment culture. Collection of an aerosolized dirt inoculum is accomplished by a gas operated suction pickup. Checkout equipment is described which provides automatic control and data readout. Ability of the device to withstand high temperature sterilization is shown. Recommendations for engineering improvements are made.

Author

N66-23791*# Naval School of Aviation Medicine, Pensacola, Fla.

ELICITATION OF HORIZONTAL NYSTAGMUS BY PERIODIC LINEAR ACCELERATION

Jorma I. Niven, W. Carroll Hixson and Manning J. Correia 17 Dec. 1965 27 p refs Joint rept. with NASA /Its Rept.-128 (NASA Order R-93)

(NASA-CR-74142; NAMI-953) CFSTI: HC \$2.00/MF \$0.50 CSCL 06S

Four subjects in each of four different body orientations were exposed to periodic linear acceleration stimuli produced

by simple harmonic translation of 0.2, 0.4, and 0.8 cps cyclic frequency along an Earth horizontal axis. Highly systematic horizontal nystagmus was demonstrated in response to these stimuli as well as to linear accelerations of rotating vector form equivalent to counterrotation in a constant magnitude linear force field. Vertical nystagmus could not be demonstrated for similar stimuli. The magnitude of the slow component of nystagmus and the phase lag of the nystagmic response behind the linear acceleration stimulus were found to differ from those associated with periodic angular stimulation of the semicircular canals in a comparable frequency range. Regardless of stimulus form, the effective stimulus element for elicitation of horizontal nystagmus appeared to be dynamic change in the linear acceleration component directed along the subject's γ (left-right) head axis.

Author

N66-23811*# Miami Univ., Coral Gables, Fla.

[INVESTIGATIONS IN SPACE-RELATED BIOLOGY, INCLUDING MOLECULAR EVOLUTION AND RELEVANT ASPECTS OF THE EXTRATERRESTRIAL ENVIRONMENT] Semiannual Status Report, 1 Jun.-1 Dec. 1965 [1965] 11 p refs
(Grant NsG-689)

(NASA-CR-71940) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

Progress is reported on investigations of molecular evolution and relevant aspects of the extraterrestrial environment. This report describes continued activities on the preparation and properties of thermal poly-alpha-amino acids and thermal polynucleotides, and on the behavior of microscopic units which organize spontaneously when amino acid condensates are brought into contact with water. The catalytic property of proteinoids was studied particularly in the hydrolysis of ATP, ADP, and AMP, and in the decarboxylation of pyruvic acid. The degree of heterogeneity of thermal proteinoids was more closely examined by fractionation of an amidated proteinoid on DEAE-cellulose columns and analysis of three of six fractions obtained. These show amino acid compositions which are similar to each other and to the analysis of the crude. Optical resolution of amino acids by a stereoselective ligand exchange and by inoculation of supersaturated solutions of racemate were demonstrated. Thermal and Leuchs proteinoids were shown to have nutritive quality for *Tetrahymena pyroformis* R. Proteinoid microspheres were subjected to increased pH and examined in the quartz optics microscope. Microphotographs show the effects.

R.N.A.

N66-23815*# Rochester Univ., N. Y.

STATISTICAL ANALYSIS OF MARS MICROBE DETECTION SYSTEM III

[1965] 25 p refs

(Grant NsG-209)

(NASA-CR-71760) CFSTI: HC \$1.00/MF \$0.50 CSCL 06M

This report presents a statistical analysis of data obtained from the Wolf Trap life detector experiment. The analysis is based on a growth model, shown graphically, which assumes that the observed response is an additive combination of soil settling, growth of first organism, growth of second organism, and a residual error. A more specific discussion of these assumptions is included. From these assumptions it is possible to postulate any finite number of growth organisms and estimate the corresponding unknown parameters.

R.N.A.

N66-23819*# National Biomedical Research Foundation, Silver Spring, Md.

ATLAS OF PROTEIN SEQUENCE AND STRUCTURE Margaret O. Dayhoff, Richard V. Eck, Marie A. Chang, and Minnie R. Sochard 1965 111 p refs

(Contract NSR-21-003-002; Grants NIH GM-08710; NIH GM-12168)

(NASA-CR-71805) CFSTI: HC \$4.00/MF \$0.75 CSCL 06A

This atlas is presented to facilitate the theoretical study of protein sequences and structures. The information is kept in a compact uniform format on punched cards. New information and corrections are easily inserted, while the text is kept accurate. The currently accepted amino acid sequence of every protein for which complete or substantial data is available is included. Only the definitive report giving the complete sequence from each laboratory is referenced, however, if a substantial amount of work was done on the same protein in other laboratories, their reports are also referenced. Some smaller peptides are also included. The format in which the atlas is kept on punched cards is suitable for direct use in computer programs. A three-letter code is used which is a slight modification of the conventional notation, and also a mnemonic one-letter code which is clearer and more suitable for certain comparative studies. A system of punctuation is used to describe the degree of confidence in each bond. Brief remarks are also included about the nature and function of the protein, the location of S-S bonds, amino acids involved in active sites, and three-dimensional structures.

R.N.A.

N66-23822*# North American Aviation, Inc., Los Angeles, Calif.

DEVELOPMENT AND TESTING OF A PROTOTYPE RESPIRATION ANALYZER, PHASE II Final Report

R. K. Breeze 25 Jan. 1965 101 p refs

(Contract NAS4-367)

(NASA-CR-57210; NA-65-22) CFSTI: HC \$4.00/MF \$0.75 CSCL 06B

This report describes the development and testing of a prototype respiration analyzer. The analyzer was tested at sea level and at 25,000 ft in an altitude chamber with human subjects under three conditions of physical work output to evaluate its response characteristics and accuracy, and to determine its feasibility for eventual airborne use. Because of problems, new work tasks were initiated to make a theoretical comparison of two competitive flowmeters, establish the number of flowmeters required, verify the use of the perfect gas law, specify requirements for an isothermal system and specify requirements to achieve the desired degree of measurement accuracy. These were modified in an effort to determine oxygen consumption from the data taken during the earlier tests. This effort resulted in an error analysis which indicated the futility of trying to determine oxygen consumption by the difference in mass flow of inspired and expired gases. Recommendations are made as to the use of indirect methods of computing oxygen consumption and as to the direction that should be taken in the follow-on studies.

R.N.A.

N66-23841*# National Academy of Sciences—National Research Council, Washington, D. C.

REPORT ON TRAVEL GRANTS ACTIVITY OF U. S. NATIONAL COMMITTEE FOR PURE AND APPLIED BIOPHYSICS, NAS-NRC, NAPLES, ITALY, SEPTEMBER 8-11, 1965

[1965] 12 p

(Grant NGR-09-012-027)

(NASA-CR-71696) CFSTI: HC \$1.00/MF \$0.50 CSCL 06A

An overview is presented of a symposium dealing with *Some Biological Systems at the Molecular Level*, and a resume of reports delivered during this four-day meeting is included. Members present at the meeting of the *Commission on Molecular Biophysics*, which convened for two days, are listed.

M.W.R.

N66-23846# Texas Inst. for Rehabilitation and Research, Houston.

THE EFFECT OF BEDREST ON VARIOUS PARAMETERS OF PHYSIOLOGICAL FUNCTION. PART XIII: A REVIEW OF POSSIBLE MECHANISMS OF ORTHOSTATIC INTOLERANCE TO PASSIVE TILT

F. B. Vogt, W. A. Spencer, D. Cardus, and C. Vallbona. Washington, NASA, May 1966. 22 p. refs.

(Contract NAS9-1461)

(NASA-CR-183) CFSTI: HC \$1.00/MF \$0.50 CSCL 06 S

A review has been made of possible mechanisms of orthostatic intolerance to passive tilt, which includes observations from water immersion and bedrest experiments. The review relates the observation on cardiovascular function, intravascular volume, and transfer of fluids and electrolytes into and out of the vascular system to orthostatic intolerance to passive tilt. Experimental procedures are suggested which would test the meaning of the observations to account for the intolerance to passive tilting after prolonged bedrest. Author

are conceptualized as consisting of members involved in patterns of reciprocated reinforcement. Insofar as one individual has reinforced another in the past, it is hypothesized that reciprocal reinforcement will be available to him from that individual in the future. The availability of this support helps ward off breakdown in the face of stress. Individuals for whom this support is not available are thus more likely to become incapacitated by stress than are individuals involved in reciprocal relationships. These isolated individuals have been chosen for study. It is posited that there are two dimensions along which such isolation may take place: instrumental (having to do with work relationships), and effective (having to do with emotional relationships). The present study tests the hypothesis that poor performance may be predicted from isolation. A further aim of the present study is to develop techniques for modifying the isolation of squad members to improve performance. Author (TAB)

N66-23885# Washington Univ., Seattle.

ON THE NATURE OF LAWS IN PSYCHOLOGY

Eugene Galanter [1965] 23 p. refs.

(Contract Nonr-477(34))

(PLR-16N; AD-629680) CFSTI: HC \$2.60/MF \$0.50

Arguments are presented to support the point of view that psychological laws are most appropriately sought among response-response relations. Examples drawn from the psychology of learning, remembering, and perceiving are used to illustrate the argument. Author (TAB)

N66-23872# Miami Univ., Coral Gables, Fla. Bascom Palmer Eye Inst.

HUMAN ELECTRORETINOGRAPHY AS A GAUGE OF VISUAL PERFORMANCE. Third Annual Progress Report, Jun. 1, 1964-Aug. 31, 1965

Thorne Shopley. 31 Aug. 1965. 48 p.

(Contract DA-49-193-MD-2344)

(AD-629737) CFSTI: HC \$2.00/MF \$0.50

A short review of the clinical findings with the Cordis ERG apparatus to date is presented on: night-blindness, retinal detachment, rheumatoid arthritis, congenital aphakia, high myopia, primary and secondary retinitis pigmentosa, optic atrophy, glaucoma, trauma, cataract and neonates. A chart of the ERG patterns to be expected in most ophthalmological disorders has also been drawn up. Summaries are included of six manuscripts which are now in press or in preparation. Four new pieces of research equipment are described: three are special stimulators and one is a dual-channel ERG apparatus. The directions in which the research is now headed are noted and compared to those which were summarized in our last report. Author (TAB)

N66-23883# Wakoff Research Center, Staten Island, N. Y. **PSYCHOSOCIAL FACTORS IN MILITARY DEVIANCE. Annual Report, Mar. 1965-Mar. 1966**

Sheldon Blackman, Kenneth M. Goldstein, Wallace Mandell, and Donald J. Collins. Mar. 1966. 7 p. refs.

(Contract DA-49-193-MD-2538)

(TR-2; AD-629630) CFSTI: HC \$1.10/MF \$0.50

The study is the second in a planned program of research designed to make available tested methods of modifying basic training squads that will be useful in improving the performance of military personnel. The theoretical position underlying this work has been summarized in Blackman, Mandell, Goldstein, and Silberstein (1965). Briefly, small groups

1966

IAA ENTRIES

A66-22297

LIFE SCIENCES.

Camden, N.J., Radio Corporation of America, 1965. 47 p.

CONTENTS:

MICROCIRCUIT-MICROWATT DESIGN TECHNIQUES FOR NEW INTERNAL MEDICAL SENSORS. F. L. Hatke and L. E. Flory (Radio Corporation of America, Princeton, N.J.), p. 13-15. 13 refs. [See A66-22298 11-05]

ADAPTATION THEORY - A TUTORIAL INTRODUCTION TO CURRENT RESEARCH. J. Sklansky (Radio Corporation of America, Princeton, N.J.), p. 24-30. 13 refs. [See A66-22299 11-05]

NEURAL, THRESHOLD, MAJORITY, AND BOOLEAN LOGIC TECHNIQUES - A COMPARATIVE SURVEY. C. R. Atzenbeck and D. Hampel (Radio Corporation of America, New York, N.Y.), p. 31-35. 10 refs. [See A66-22300 11-08]

HUMAN FACTORS ENGINEERING - MORE THAN JUST THE "BLESSING." H. B. Matty (Radio Corporation of America, Camden, N.J.), p. 42-44. [See A66-22301 11-05]

A66-22298

MICROCIRCUIT-MICROWATT DESIGN TECHNIQUES FOR NEW INTERNAL MEDICAL SENSORS.

F. L. Hatke and L. E. Flory (Radio Corporation of America, Defense Electronic Products, Astro-Electronics Div., Applied Research Laboratory, Princeton, N.J.).
IN: LIFE SCIENCES.

Camden, N.J., Radio Corporation of America, 1965, p. 13-15. 13 refs.

Description of newly developed medical sensing devices which require less sensitive transducers because of the high electronic gains now possible and which take up less room within the body at the cost of increasing complexity outside of it. In the passive system energy is supplied to the capsule from the outside which energizes the capsule circuit; a portion of this energy is then returned to the outside equipment together with the telemetered data. In this way the device within the body is freed of battery requirements and its life can be extended indefinitely. Pressure and temperature sensors are described. A passive biological potential measuring device is discussed which incorporates an FET coupled with a junction transistor in the same assembly, using microcircuit microwatt technology.

(Author)

A66-22299

ADAPTATION THEORY - A TUTORIAL INTRODUCTION TO CURRENT RESEARCH.

J. Sklansky (Radio Corporation of America, RCA Laboratories, Princeton, N.J.).
IN: LIFE SCIENCES.

Camden, N.J., Radio Corporation of America, 1965, p. 24-30. 13 refs. Research supported by the Radio Corporation of America; Contracts No. AF 33(657)-11336; No. AF 33(615)-1764.

In 1961, RCA Laboratories initiated a program of research toward the development of a theory of adaptation. With this theory, the engineer will gain fundamental insights into the ways he can use simple feedback mechanisms to give adaptive properties to complex systems. Recent results center on adaptive signal detection and adaptive pattern recognition. The paper given introduces the concepts of adaptation theory, and then discusses the particular class of adaptive process on which RCA Laboratories work has concentrated thus far - that of the threshold learning process and Markov chains, the specific mathematical techniques associated with it. Included are some recent results on learning waves, feedback-adaptivity relationships, and learning times, as well as mention of some as-yet-unexplained phenomena. Some directions of future work are discussed, and a reference bibliography is included.

(Author)

A66-22301

HUMAN FACTORS ENGINEERING - MORE THAN JUST THE "BLESSING."

H. B. Matty (Radio Corporation of America, Defense Electronic Products, Communications Systems Div., Human Factors Engineering Group, Camden, N.J.).
IN: LIFE SCIENCES.

Camden, N.J., Radio Corporation of America, 1965, p. 42-44.

Demonstration that human factors engineering should be included as an integral part of the systems and design engineering. Human factors engineering is concerned with the generation of system requirements and includes the following topics - (1) man-machine allocation of system functions, (2) task-equipment analysis, (3) operations analysis, (4) model and mockup analysis, and (5) environmental analysis. The inclusion of human factors engineering problems starting with the preliminary system designs and continuing through the hardware design phases provides assurance that equipment designs conform to human factors standards.

D. P. F.

A66-22303

DIRECT EVIDENCE FOR THE CATHODIC DEPOLARIZATION THEORY OF BACTERIAL CORROSION.

Warren P. Iverson (U.S. Army, Biological Laboratories, Fort Detrick, Md.).

Science, vol. 151, Feb. 25, 1966, p. 986-988. 7 refs.

Cathodic depolarization of mild steel by *Desulfovibrio desulfuricans* was demonstrated with benzyl viologen used as an electron acceptor. Direct measurement of the cathodic depolarization current indicated a maximum current density of $1 \mu\text{A}/\text{cm}^2$. Aluminum alloys were also cathodically depolarized by the organism.

(Author)

A66-22478

SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I.
Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965. 511 p. In Italian, English, and French.

CONTENTS:

SESSION 1 [I TEMA DI RELAZIONE]

THE PRESENT EPIDEMIOLOGICAL SITUATION AND POSSIBLE FORECASTS CONCERNING THE FUTURE COURSE OF SOME QUARANTINABLE DISEASES IN THE WORLD - PLAGUE, CHOLERA, SMALL POX [SITUAZIONE EPIDEMIOLOGICA ATTUALE E POSSIBILI PREVISIONI CIRCA IL FUTURO DESTINO DI ALCUNE MALATTIE QUARANTENARIE NEL MONDO - PESTE, COLERA, VAIOLO]. V. Del Vecchio (Roma, Università, Istituto d'Igiene, Rome, Italy) and G. Lalli (Ispettorato di Sanità Aeronautica, Rome, Italy), p. 3-328.

INTERNATIONAL SANITARY REGULATIONS AND AIR TRAFFIC.

R. I. Hood (World Health Organization, Geneva, Switzerland), p. 329-341; Discussion, p. 345-349. [See A66-22479 11-05]

PRACTICAL APPLICATION FOR AVIATION OF THE QUARANTINE MEASURES OF THE WORLD HEALTH ORGANIZATION [APPLICATION PRATIQUE POUR L'AVIATION DES MESURES QUARANTENAIRES DE L'ORGANISATION MONDIALE DE LA SANTE] A. Allard (Société Anonyme Belge d'Exploitation de la Navigation Aérienne, Brussels, Belgium), p. 343, 344.

DISCUSSION OF SESSION 1 [DISCUSSIONE SUL 1° TEMA DI RELAZIONE], p. 345-349.

SESSION 2 [II TEMA DI DISCUSSIONE]

INTRODUCTION TO THE PROBLEM OF WEIGHTLESSNESS IN SPACEFLIGHT AND OF THE TRANSITION FROM ACCELERATIONS TO WEIGHTLESSNESS AND VICE VERSA - SYNTHESIS OF THE RESULTS OBTAINED ON MAN AND ANIMALS BY MEANS OF A SUBGRAVITY TOWER AND A SUBGRAVITY AXIS [INTRODUZIONE SUL PROBLEMA DELL'ASSENZA DI PESO NEL VOLO SPAZIALE E DEL PASSAGGIO DALLE ACCELERAZIONI ALL'ASSENZA DI PESO E VICEVERSA - SINTESI DEI RISULTATI OTTENUTI SULL'UOMO E SULL'ANIMALE MEDIANTE LA TORRE E L'ASSE DI SUBGRAVITA']. T. Lomonaco (Ispettorato di Sanità Aeronautica, Rome, Italy), p. 353-371; Discussion, p. 435, 436. [See A66-22480 11-04]

VESTIBULAR FUNCTION IN CONDITIONS OF SUBGRAVITY [LA FUNZIONE VESTIBOLARE IN CONDIZIONI DI SUBGRAVITA']. R. Margaria and T. Gualtierotti (Milano, Università, Milan, Italy), p. 373-388; Discussion, p. 435, 436. [See A66-22481 11-04]

NEUROPHYSIOLOGIC RESPONSES TO GRAVITATIONAL FIELD CHANGES AND TO SHORT PERIODS OF ZERO GRAVITY [REPONSES NEUROPHYSIOLOGIQUES AUX VARIATIONS DU CHAMP GRAVITATIONNEL ET A DE BREVES PERIODES DE GRAVITATION NULLE]. R. Grandpierre (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France), p. 389-398; Discussion, p. 435, 436. [See A66-22482 11-04]

EFFECTS OF WEIGHTLESSNESS ON MAN DURING U.S. SUB-ORBITAL AND ORBITAL FLIGHTS. S. J. Gerathewohl (NASA, Ames Research Center, Moffett Field, Calif.), p. 399-428; Discussion, p. 435, 436. 33 refs. [See A66-22483 11-04]

PROBLEMS OF LONG PERIODS OF WEIGHTLESSNESS [SUI PROBLEMI DI LUNGI PERIODI DI ASSENZA DI PESO]. H. J. von Beckh (USAF, Systems Command, Holloman AFB, N. Mex.), p. 429-434; Discussion, p. 435, 436. 20 refs. [See A66-22484 11-04]

DISCUSSION OF SESSION 2 [DISCUSSIONE SUL 2° TEMA DI RELAZIONE], p. 435, 436.

SESSION 3 [III TEMA DI RELAZIONE]

THE STATE OF HUMAN CONFINEMENT AS A PSYCHOLOGICAL AND SPACE MEDICINE PROBLEM IN THE LIGHT OF EARLY EXPERIMENTAL INVESTIGATIONS [LO STATO DI CONFINAMENTO UMANO COME PROBLEMA PSICOLOGICO E DI MEDICINA SPAZIALE ALLA LUCE DELLE PRIME INDAGINI SPERIMENTALI E DELLE PROSPETTIVE FUTURE]. M. Strollo (Ispettorato di Sanità Aeronautica, Rome, Italy), p. 439-451. [See A66-22485 11-04]

SOLITARY CONFINEMENT - CLINICAL OBSERVATIONS AND TESTS ON NEUROTIC SUBJECTS [CONFINAMENTO SOLITARIO - OSSERVAZIONI CLINICHE ED ESPERIMENTI SU SOGGETTI NEVROTICI]. R. Virgili (Ospedale Psichiatrico Provinciale, Rome, Italy), p. 453-468. [See A66-22486 11-04]

DISORIENTATION, TIME PERCEPTION AND ISOLATION. T. C. D. Whiteside (Royal Air Force, Farnborough, Hants., England), p. 469-475; Discussion, p. 511. [See A66-22487 11-04]

PROBLEMS OF SPACEFLIGHT PSYCHOLOGY [PROBLEMI DI PSICOLOGIA DEL VOLO SPAZIALE]. L. Ancona (Milano, Università Cattolica del Sacro Cuore, Milan, Italy), p. 477-487. [See A66-22488 11-04]

RESPONSES OF THE CENTRAL NERVOUS SYSTEM ON THE ACTION OF SOME SPACEFLIGHT FACTORS - ELECTROPHYSIOLOGICAL STUDY [RISPOSTE DEL SISTEMA NERVOSO CENTRALE ALL'INFLUENZA DI TALUNI FATTORI MANIFESTANTISI NEL VOLO SPAZIALE - STUDIO ELETTROFISIOLOGICO]. V. V. Parin, O. G. Gazenko, and A. N. Razumeev (Akademiia Nauk SSSR, Moscow, USSR), p. 489-495.

RESPONSES OF THE CENTRAL NERVOUS SYSTEM ON THE ACTION OF SOME FACTORS OF THE SPACE FLIGHT - ELECTROPHYSIOLOGICAL STUDY. V. V. Parin, O. G. Gazenko, and A. N. Razumeev (Academy of Sciences, Moscow, USSR), p. 497-510. [See A66-22489 11-04]

DISCUSSION OF SESSION 3 [DISCUSSIONE SUL 3° TEMA DI RELAZIONE], p. 511.

A66-22479

INTERNATIONAL SANITARY REGULATIONS AND AIR TRAFFIC. R. I. Hoed (World Health Organization, Geneva, Switzerland). IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 329-341; Discussion, p. 345-349, in English, French, and Italian.

Discussion of the International Regulations of the World Health Organization. It is noted that the regulations constitute a uniform code for quarantine practices in international traffic. Their essential aim is to ensure the maximum security against the international spread of diseases with minimum interference with world traffic. In 1951 the number of passengers on scheduled services in international civil aviation was 42 million; in 1962 this number had risen to 123 million. It is pointed out that, considering this single factor, it is not surprising that air traffic has played an increased role in the international spread of smallpox. M. M.

A66-22480

INTRODUCTION TO THE PROBLEM OF WEIGHTLESSNESS IN SPACEFLIGHT AND OF THE TRANSITION FROM ACCELERATIONS TO WEIGHTLESSNESS AND VICE VERSA - SYNTHESIS OF THE RESULTS OBTAINED ON MAN AND ANIMALS BY MEANS OF A SUBGRAVITY TOWER AND A SUBGRAVITY AXIS [INTRODUZIONE SUL PROBLEMA DELL'ASSENZA DI PESO NEL VOLO SPAZIALE E DEL PASSAGGIO DALLE ACCELERAZIONI ALL'ASSENZA DI PESO E VICEVERSA - SINTESI DEI RISULTATI OTTENUTI SULL'UOMO E SULL'ANIMALE MEDIANTE LA TORRE E L'ASSE DI SUBGRAVITA']. T. Lomonaco (Ispettorato di Sanità Aeronautica, Rome, Italy).

IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 353-371; Discussion, p. 435, 436. In Italian; Discussion in English.

Brief review of investigations of the effect of sub- and zero-gravity on man. The results obtained at the Centro Studi e Ricerche di Medicina Aeronautica e Spaziale in investigations of weightlessness, and particularly the transition from accelerations to weightlessness and vice versa, are described. The physiological aspects of equilibrium and orientation in the weightless state are examined. M. M.

A66-22481

VESTIBULAR FUNCTION IN CONDITIONS OF SUBGRAVITY [LA FUNZIONE VESTIBOLARE IN CONDIZIONI DI SUB-GRAVITA']. R. Margaria and T. Gualtierotti (Milano, Università, Istituto di Fisiologia Umana e Generale, Milan, Italy). IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 373-388; Discussion, p. 435, 436. In Italian; Discussion in English.

Discussion of factors pointing to the necessity of investigating possible labyrinth changes in conditions of zero gravity at the present stage of spaceflight. Theoretical concepts are discussed which call for testing in a satellite. The experimental animals recommended for the test are pigeons, wistiti monkeys, or frogs. M. M.

A66-22482

NEUROPHYSIOLOGIC RESPONSES TO GRAVITATIONAL FIELD CHANGES AND TO SHORT PERIODS OF ZERO GRAVITY [REPONSES NEUROPHYSIOLOGIQUES AUX VARIATIONS DU CHAMP GRAVITATIONNEL ET A DE BREVES PERIODES DE GRAVITATION NULLE]. R. Grandpierre (Centre d'Enseignement et de Recherches de Médecine Aéronautique, Paris, France).

IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 389-398; Discussion, p. 435, 436. In French; Discussion in English.

Discussion of investigations of the integrative activity of the central nervous system at different levels of intensity of the gravitational field and at the time of changes of the latter. The overall results achieved in investigations made in this field are reviewed. M. M.

A66-22483

EFFECTS OF WEIGHTLESSNESS ON MAN DURING U.S. SUB-ORBITAL AND ORBITAL FLIGHTS.

S. J. Gerathewohl (NASA, Ames Research Center, Moffett Field, Calif.).

IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 399-428; Discussion, p. 435, 436. 33 refs.

Analysis of data obtained from Project Mercury with regard to the effects of weightlessness on man. Some of the conclusions drawn are: (1) weightlessness does not seem to have any psychological effects on man. Operational and experimental performance were

maintained on the highest level through all phases of the missions; (2) consistent trends of response changes during the flights were best reflected by the vital signs. Cardiovascular, pulmonary, and metabolic changes were found which may be associated with weightlessness; (3) a mild mineral mobilization resulted in increments of urinary potassium excretion and hypercalcemia; (4) consistent changes in blood chemistry concerned increments in white blood cells, hemoglobin, hematocrit, and monocytes; and (5) all abnormalities attributed to weightlessness during the Mercury flights were well within the tolerance limits of the human organism. It is noted that there are no psychological or physiological contraindications to embarking on longer spaceflight missions. M.M.

A66-22484

PROBLEMS OF LONG PERIODS OF WEIGHTLESSNESS [SUI PROBLEMI DI LUNGHI PERIODI DI ASSENZA DI PESO].

H. J. von Beckh (USAF, Systems Command, Aerospace Medical Div., Aeromedical Research Laboratory, Holloman AFB, N.Mex.). IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 429-434; Discussion, p. 435, 436. 20 refs. In Italian; Discussion in English.

Discussion of problem areas of protracted weightlessness. These areas include aculographic illusion, temporary decrease of neuromuscular coordination, motion sickness, disorientation, and digestive tract and cardiovascular phenomena. The original thinking of early research is compared with recent results in an effort to predict physiological reactions to weightlessness of critical duration which are today beyond operational possibilities. M.M.

A66-22485

THE STATE OF HUMAN CONFINEMENT AS A PSYCHOLOGICAL AND SPACE MEDICINE PROBLEM IN THE LIGHT OF EARLY EXPERIMENTAL INVESTIGATIONS [LO STATO DI CONFINAMENTO UMANO COME PROBLEMA PSICOLOGICO E DI MEDICINA SPAZIALE ALLA LUCE DELLE PRIME INDAGINI SPERIMENTALI E DELLE PROSPETTIVE FUTURE].

M. Strollo (Ispettorato di Sanità Aeronautica, Ufficio Studi, Rome, Italy). IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 439-451. In Italian.

Discussion of early investigations of the psychological and medical aspects of human confinement. The topics considered are: (1) necessity for the conceptual delimitation of the terms confinement, isolation, and sensory deprivation; (2) review of experimental investigations; (3) sensory deprivation; (4) confinement without deafferentation and with partial immobilization; (5) unrestricted confinement-isolation; (6) confinement-isolation in actual flight situations; and (7) general considerations and future prospects. M.M.

A66-22486

SOLITARY CONFINEMENT - CLINICAL OBSERVATIONS AND TESTS ON NEUROTIC SUBJECTS [CONFINAMENTO SOLITARIO - OSSERVAZIONI CLINICHE ED ESPERIMENTI SU SOGGETTI NEVROTICI].

R. Virgili (Ospedale Psichiatrico Provinciale, Rome, Italy). IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 453-468. In Italian.

Discussion of the results of tests of solitary confinement on neurotic subjects. The phenomenological modes of the expected breakdown were observed. All the subjects passed the test against all expectations, and the possible reasons for this are explained. M.M.

A66-22487

DISORIENTATION, TIME PERCEPTION AND ISOLATION.

T. C. D. Whiteside (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 469-475; Discussion, p. 511, in English and French.

Discussion of experiments indicating that, in those visual illusions in which there is no apparent eye displacement responsible for the phenomenon, the sensation seems to be associated with involuntary activity in the oculomotor system. M.M.

A66-22488

PROBLEMS OF SPACEFLIGHT PSYCHOLOGY [PROBLEMI DI PSICOLOGIA DEL VOLO SPAZIALE].

L. Ancona (Milano, Università Cattolica del Sacro Cuore, Istituto di Psicologia, Milan, Italy).

IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 477-487. In Italian.

Discussion of problems connected with the emotional status of astronauts during spaceflight. The accomplishments achieved so far and still to be achieved in the field of the psychological knowledge of spaceflight, particularly regarding the disturbances undergone by the total mental behavior, are briefly reviewed. M.M.

A66-22489

RESPONSES OF THE CENTRAL NERVOUS SYSTEM ON THE ACTION OF SOME FACTORS OF THE SPACE FLIGHT - ELECTROPHYSIOLOGICAL STUDY.

V. V. Parin, O. G. Gzenko, and A. N. Razumeev (Academy of Sciences, Moscow, USSR).

IN: SIXTH INTERNATIONAL AND TWELFTH EUROPEAN CONGRESS OF AVIATION AND SPACE MEDICINE, ROME, ITALY, OCTOBER 1-5, 1963, LECTURES. VOLUME I. [A66-22478 11-04] Rome, Comitato Organizzatore del Congresso di Medicina Aeronautica e Spaziale, 1965, p. 497-510.

Experimental investigation of the action potentials of separate neurons of the giant cell nucleus from reticular formation during the action of transverse accelerations (3 to 5 g) in cats under chloralose anesthesia. The recording of action potentials was done with the use of glass microelectrodes filled with a 2.5 M solution of potassium chloride. Limansky's approach to reticular formation was used. It is noted that the data obtained showed that the initial changes in the activity of separate neurons consist in rhythm acceleration (stage of the rate increase). The next stage showed a grouping of impulses alternating with augmenting periods of low activity. The last stage was that of "silence." M.M.

A66-22573

EFFECTS OF IMMERSION, RECUMBENCY AND ACTIVITY ON ORTHOSTATIC TOLERANCE.

Daniel E. Torphy (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biodynamics Branch, Acceleration Section, Brooks AFB, Tex.).

Aerospace Medicine, vol. 37, Feb. 1966, p. 119-124. 20 refs.

The effects of water immersion for six hours without negative breathing pressures were studied in five subjects. Control conditions of normal activity and bed rest with and without activity were also studied to delineate the separate effects, if any, of activity, recumbency and immersion. Heart rate during the separate conditions as well as resting and tilted blood pressures were measured and statistically analyzed. No statistically significant decrement in heart rate and blood pressure response to tilting was found, although immersion resulted in a tendency toward increased heart rate and blood pressures as well as greater narrowing of pulse pressure with tilting. The deficiencies of tilt table testing are discussed and our findings on tilt angle and parameters dependent on degree of orthostatic stress presented. (Author)

A66-22574

VALIDITY OF A BRIEF VESTIBULAR DISORIENTATION TEST IN SCREENING PILOT TRAINEES.

Rosalie K. Ambler and Fred E. Guedry, Jr. (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).

(Aerospace Medical Association, Annual Scientific Meeting, 36th, New York, N.Y., Apr. 26-29, 1965, Paper.)

Aerospace Medicine, vol. 37, Feb. 1966, p. 124-126. 11 refs.

Brief Vestibular Disorientation Test (BVDT) has been developed that involves an assessment of subjects' reactions produced by head movements in a rotating chair. Reliability of measurement has been demonstrated by the substantial agreement among several types of observers using the BVDT technique for the same subjects and by the substantial agreement of the observers' BVDT ratings with the subjects' self-ratings of sensitivity. This study investigated the validity of the test for predicting various pilot training criteria. Two hundred and twenty-six naval aviation trainees were administered the BVDT during the latter part of their pre-flight training. After the subjects had had the opportunity either to complete training or separate therefrom, the test results were evaluated for their relation to the following criteria: (1) students separated from flight training for all causes vs completions, (2) tension and/or airsick separations vs all others, and (3) airsick separations vs all others. Results indicated that relationships existed between high sensitivity scores on the BVDT and membership in the various separation groups. The airsick/separation group had the highest mean BVDT sensitivity score. Statistical evidence indicated that the BVDT ratings tapped a significant portion of the flight criterion variance not reached by the present flight aptitude tests. (Author)

A66-22575

PHYSIOLOGICAL REACTIONS OF THE HUMAN BODY TO TRANSVERSE ACCELERATION AND SOME MEANS OF INCREASING THE ORGANISM'S RESISTANCE TO THESE EFFECTS. A. S. Barer, G. A. Golov, V. B. Subavin, K. I. Murakchovskii, S. A. Rodin, E. I. Sorokina, and E. P. Tikchomirov (Academy of Sciences, Moscow, USSR).

Aerospace Medicine, vol. 37, Feb. 1966, p. 127-133. 20 refs.

Flight in a space vehicle is accompanied by the effects of exposure of the subject to different accelerations. Prolonged acceleration appears during the start and at the reentry of the space vehicle into the earth's atmosphere. It also can occur during maneuvers while in flight. Three general groups of experiments are described herein. The first group considers the limits of human tolerance to prolonged forward acceleration at an angle of 65° to the longitudinal axis of the body. The second group of experiments includes tests of different methods whereby human tolerance to transverse acceleration might be increased. The third group of experiments contains investigations in which the tolerance to acceleration was determined in time under selected optimal conditions. Detailed records and data were obtained during each experiment on certain physiological functions of the human body. Complete analysis of these data are discussed. Although estimates were made in this study of methods for increasing resistance of the human being to prolonged acceleration stress and limits of tolerance to this stress were established, unanswered questions still remain regarding the reaction of the organism to stress. Detailed analyses of the questions raised are considered in the paper. Physiological responses of the human being to these stresses are considered in light of the experimental data contained in the manuscript. (Author)

A66-22576

TOLERANCE TO SPINNING IN EJECTION ESCAPE.

D. E. Courts (Lockheed Aircraft Corp., Lockheed-California Co., Burbank, Calif.).

Aerospace Medicine, vol. 37, Feb. 1966, p. 133-135.

Some modern-day ejection systems employ a small stabilizing parachute which introduces a spin to the man-seat package during descent. In this study, spin rates of 30 to 90 rpm for 4 min were duplicated, using eight human subjects in an effort to ascertain whether temporary incapacitation would occur which would compromise a safe parachute landing. Reaction to spinning was determined by subjective complaints of nausea and dizziness and objective identification of nystagmus. Careful examination of the subjects' faces was conducted for evidence of swelling, petechial hemorrhages, and conjunctivitis. Results of the testing revealed that the design characteristics of the ejection system under study minimize the possibility of incapacitation. (Author)

A66-22577

OBJECTIVE DETERMINATIONS OF BONE CALCIUM LEVELS.

John M. Dick (Douglas Aircraft Co., Los Angeles, Calif.).

Aerospace Medicine, vol. 37, Feb. 1966, p. 136-139. 14 refs.

A study was conducted to determine the amount of bone calcium loss during two weeks of simulated weightlessness. Urine calcium levels were determined at the beginning and the end of the test. X-ray films utilizing the wedge technique were also taken of the os calcis at these same times. A net loss of approximately 2 gms of urinary calcium was noted during this period. The X-ray wedge technique did note a change in the os calcis, but it is questionable if such a slight change is statistically significant. It was concluded from this study that the calcium loss that would be incurred by two weeks of weightlessness would be minimal. If one extrapolates the above data, it is estimated that 6 to 12 months exposure can be safely tolerated without any detrimental or permanently damaging effects. (Author)

A66-22578

DISORIENTATION EXPERIENCES OF ARMY HELICOPTER PILOTS.

Frank W. Ogden, Quitman W. Jones, and Harold R. Chappell (U.S. Army, BAAR; U.S. Army, Aeromedical Research Unit, Fort Rucker, Ala.).

Aerospace Medicine, vol. 37, Feb. 1966, p. 140-143. 13 refs.

Study of the problem of spatial disorientation in helicopters. The purpose of this study is to show the nature and magnitude of this problem, and to learn from helicopter accident experience where design improvements are needed. Statistics of accidents and their causes are given, comparing two groups of aviators. It is concluded that present instruments are unsatisfactory in aircraft with multidirectional capabilities such as helicopters. Therefore, more training is necessary and instruments designed to meet the special characteristics of rotary wing aircraft must be developed. A set of remedies and advices is included in a discussion following the article. M. F.

A66-22579

INTERACTION OF LINEAR AND ANGULAR ACCELERATIONS ON VESTIBULAR RECEPTORS IN MAN.

A. J. Benson and M. A. Bodin (Royal Air Force, Institute of Aviation Medicine, Farnborough, Hants., England).

(Aerospace Medical Association, Annual Scientific Meeting, 36th, New York, N.Y., Apr. 26-29, 1965, Paper.)

Aerospace Medicine, vol. 37, Feb. 1966, p. 144-154. 35 refs.

A 1 g rotating linear acceleration vector, produced by rotation about a horizontal cephalo-caudal axis, was found to produce compensatory nystagmus for as long as rotation continued. The velocity of the slow phase of nystagmus showed a cyclical modulation, the amplitude of which increased with the speed of rotation. Following rotation about a horizontal axis the after-sensations were all but abolished and the time constant of decay of post-rotational nystagmus was consistently shorter than when the axis of rotation was vertical. A hypothesis is presented which attempts to explain these findings by the direct action of the linear acceleration on the canal system; however, it is not possible to exclude otolithic mechanisms. (Author)

A66-22580

SYNCOPE INDUCED BY APPLICATION OF NEGATIVE PRESSURE TO THE LOWER BODY AND ITS EFFECT ON LUNG CO DIFFUSING CAPACITY.

D. B. Shaw, F. Cinkotai, and M. L. Thomson (London, University School of Hygiene and Tropical Medicine, Dept. of Occupational Health and Applied Physiology, London, England).

Aerospace Medicine, vol. 37, Feb. 1966, p. 154-157. 19 refs.

Research supported by the Medical Research Council.

Application of negative pressure of -70 cm H₂O to the lower half of the body in nine healthy human volunteers induced progressive changes in all subjects, which appeared to be typical of vasovagal syncope. The subjects withstood the strain for 7 to 17 min; atmospheric pressure was restored in time to prevent loss of consciousness in most individuals. Heart rate rose steadily to maxima between 110-140/min, then fell precipitously to normal or sub-normal levels one or two min before fainting. In all subjects the pulmonary diffusing capacity for carbon monoxide (DL_{CO}) fell by 12.5 percent on the average during the first six min of negative pressure, then rose toward control levels in 5 of the 7 subjects

who had tolerated the strain thus far; it was within normal limits in all subjects 8 min after removal of the strain. The circumference of the upper arm fell progressively until the pressure was restored. One experiment using radioactive xenon (Xe 133) indicated that there was an increase in the perfusion gradient down the lung during the negative pressure phase. The application of reduced pressure to the lower body should provide a safe, rapid method for studying individual resistance to vasovagal syncope and possibly to the strain of positive acceleration. (Author)

A66-22581

EFFECTS OF VIBRATION ON THE ENDOCRINE SYSTEM OF MALE AND FEMALE RATS.

Arthur M. Sackler and A. Stanley Weltman (Long Island University, Brooklyn College of Pharmacy, Research Institute, Laboratories for Therapeutic Research, Brooklyn, N.Y.).

Aerospace Medicine, vol. 37, Feb. 1966, p. 158-166. 40 refs.

This investigation reports the acute and prolonged effects of low-gravity vibration stress on the body weights, growth, food metabolism, white blood cells and the endocrine system of albino, Wistar rats. Male and female test groups were subjected to peak acceleration forces of 2.1 g for 15- or 30-min intervals administered daily during a 3 week period. The reciprocating shaker produced a horizontal movement having an amplitude of 4.6 cm and a frequency of 283 cycles/min. Prior to autopsy, body weight, food consumption, oxygen consumption and total white blood cell alterations were observed. Depending upon the degree and duration of the vibratory stress as well as sex-related resistance factors, significant and/or pronounced decreases were noted in the body weights, body weight gains, food consumption, leukocyte counts, absolute liver, kidney, spleen, thymus and seminal vesicle weights of the male rats. Corresponding significant increases were noted in the adrenal weights. In the females, vibration stress produced less pronounced effects. However, somewhat similar changes were also observed in the leukocyte counts and absolute, splenic, thymic and adrenal weights. In both sexes, the degree of change tended to diminish during the second and third weeks of stress indicating adaptation and acclimatization to vibration. In males, the data indicate that vibration produces changes typical of nonspecific stress in that it stimulates adrenal function even as it may inhibit body growth and gonadal function. The greater resistance of female rats to vibration stress modified and reduced the extent of the body growth, food utilization and endocrinal alterations. (Author)

A66-22582

AEROMEDICAL FACTORS OF TITAN II ICBM SUPPORT - A SUMMARY OF TWO YEARS' OPERATIONAL EXPERIENCE.

Charles H. Sawyer (USAF, Life Sciences Div., Norton AFB, Calif.), Emory J. Sobieski (Johns Hopkins University, School of Hygiene and Public Health, Baltimore, Md.), and Burton Jay.

Aerospace Medicine, vol. 37, Feb. 1966, p. 167-172.

Aeromedical procedures developed to support the lead Titan II Intercontinental Ballistic Missile Wing composed of 18 dispersed complexes are discussed. Mishap experience including a serious nitrogen tetroxide burn with associated chemical pneumonitis is reported. Human factors in combat missile crew duty with emphasis on fatigue, noise and nutrition are discussed. Propellant transfer experience with USAF Rocket Fuel Handlers Clothing Outfit is summarized. The results of 2939 preplacement and periodic propellant handler physicals are included. Experience gained in this missile program is referenced to future Titan II medical support requirements as well as other advanced weapon system developmental programs. (Author)

A66-22583

INTERACTIONS BETWEEN OPTOKINETIC AND VESTIBULO-OCULAR RESPONSES DURING HEAD ROTATION IN VARIOUS PLANES.

G. Melvill Jones (Defence Research Board, Aviation Medical Research Unit; McGill University, Dept. of Physiology, Montreal, Canada).

Aerospace Medicine, vol. 37, Feb. 1966, p. 172-177. 9 refs. Research sponsored by the British Medical Research Council.

Subjects were accelerated on an electronically controlled turntable to a chosen angular velocity which was then maintained constant for 3 min and finally decelerated to a standstill. They either had their heads tilted backwards, or sideways, at 45° to the vertical

axis of the turntable. Thus they were simultaneously exposed to equal angular velocity stimuli in the skull planes either of yaw and roll, or of yaw and pitch. The eyes were open and looking at an appropriate stationary optokinetic stimulator. Measurement of compensatory eye angular velocities in the relevant planes with a movie-photographic technique revealed very poor optokinetic following in the roll plane and hence wide dissociation of oculomotor responses in yaw and roll. In yaw and pitch the components of eye angular velocity were always equal to one another, despite failure (often gross) to reach the numerical value required for visual fixation. In the latter case, therefore, ocular compensation always tended to parallel that of the rotational stimulus, despite failure to achieve visual fixation. A number of applied implications are adduced. (Author)

A66-22584

ALTERNOBARIC VERTIGO AMONG PILOTS.

Claes E. G. Lundgren and Lars U. Malm (Lund, University, Institute of Physiology, Laboratory of Aviation Medicine, Lund, Sweden).

Aerospace Medicine, vol. 37, Feb. 1966, p. 178-180. 5 refs.

The occurrence of alternobaric vertigo - vertigo due to pressure changes in the middle ears - was studied by means of interviews of 108 Swedish RAF pilots. The findings are presented as statistically analyzed data and case reports. The incidence of vertigo was higher than in an earlier investigation. A positive correlation was found between colds, mismanagement of colds, difficulties in pressure equalization of the middle ears and the occurrence of vertigo. Information is given which stresses the risks connected with alternobaric vertigo in flying. (Author)

A66-22667 *

NEW LIGHT SHED ON INSTRUMENTS.

W. Tytula (Royal Canadian Air Force, Ottawa, Canada).

Flight Comment, Jan.-Feb. 1966, p. 12-15.

Discussion of several possible improvements in cockpit illumination and instrumentation for aircraft. Although it had been found that red light causes the least degradation of night vision, long exposure to it tends to produce fatigue. Red warning indicators are more prominent under white than under red lighting. Increased luminosity of the gyro horizon provides vivid sensory images which are essential to reducing disorientation. Experimental studies indicate that the color best suited for the cockpit is gray rather than black; a black instrument mounted on a gray panel serves to delineate its shape. Furthermore, the gray panel provides a visible background or reference for the instrument markings and reduces the difference between the two adaptation levels of bright sunlight and the relative darkness of the cockpit. D. P. F.

A66-22713

THE FINE STRUCTURE OF THE BACTERIAL CELL AND THE POSSIBILITY OF ITS ARTIFICIAL SYNTHESIS.

Ernest C. Pollard (Pennsylvania State University, Dept. of Biophysics, University Park, Pa.).

American Scientist, vol. 53, Dec. 1965, p. 437-463. 22 refs. NASA-supported research.

Examination of the characteristics, structure, and mode of functioning of a bacterial cell with respect to the problem of its artificial synthesis. The nature and contents of a bacterial cell are outlined. The role of DNA in cell metabolism is discussed. The DNA, RNA, and protein synthesis mechanisms are described. Analysis of the requirements for synthetic cell synthesis indicates that the assembly of components in a manner analogous to that used for mechanical devices must be discounted; an approach based upon the synthesis of a primitive type of cell followed by an artificially accelerated evolutionary process which would lead to a modern type of bacterial cell is the most promising line of research. D. P. F.

A66-22714

THE GENETIC CODE. II.

Thomas H. Jukes (California, University, Div. of Medical Physics and Space Sciences, Laboratory, Berkeley, Calif.).

American Scientist, vol. 53, Dec. 1965, p. 477-487. 27 refs. Grant No. NsG-479.

Review of the mechanisms by which the genetic message is translated into proteins through a series of biochemical events. The structure of the DNA molecule is briefly considered, and its relationship to the three species of RNA molecules - ribosomal RNA, transfer RNA, and messenger RNA - is noted. The role of these RNA species in the protein synthesis sequence is detailed. The available knowledge concerning the "triplet" code for the 20 amino acids used in the biosynthesis of proteins is then surveyed. Nirenberg's work in identifying the various "triplets" encoding the individual amino acids is reviewed, and findings obtained since then are included. The triplet code for the amino acids, including also the alternate triplets encoding the same amino acid, is presented in table form. The significance of the triplets in terms of possible mutations is then discussed. The amino acid interchanges that can occur as the result of a single-base change in the coding "triplets" are tabulated, and the corresponding mutations observed are noted. Arguments are then presented for the evolution of the "triplet" code encoding 20 amino acids and 2 "gaps" signaling the end-of-synthesis of a particular protein chain, from a primitive "quartet" code encoding 15 amino acids and one "gap." M.L.

A66-22950

NEUROPHYSIOLOGICAL EFFECTS OF EARLY SENSORY RESTRICTION.

R. Melzack and S. K. Burns (McGill University, Dept. of Psychology, Montreal, Canada; Massachusetts Institute of Technology, Dept. of Electrical Engineering and Research Laboratory of Electronics, Cambridge, Mass.).

Experimental Neurology, vol. 13, Oct. 1965, p. 163-175. 26 refs. National Institutes of Health Grants No. MH-04737-05; No. MH-04235-03; ARPA Contract No. SD-193; NSF Grant No. GP-2495; Contract No. DA-36-039-AMC-03200(E); Grant No. NSG-496.

Severe restriction of early sensory experience in dogs produces striking abnormalities in their behavior at maturity. There have been no studies, however, of the neurophysiological effects of early restriction. An exploratory study was therefore carried out with the purpose of examining the EEG as well as cortical and subcortical responses evoked by sensory stimulation in restricted dogs and their normally reared littermates. When the restricted dogs are first permitted to look at a novel environment through their open cage doors, the EEG shows a striking shift from predominantly low to high frequencies, and a shift back to low frequencies only after the door is closed. The responses evoked in the reticular formation and cortex by clicks or light flashes are reduced in amplitude, and may be altered in wave form, during the presentation of the novel environment. The results lend support to the hypothesis that the behavioral effects of early sensory restriction are due to a failure to filter out irrelevant information on the basis of prior experience thereby producing excessive CNS arousal and a disruption of perceptual discrimination and adaptive response. (Author)

A66-22975

REDUCING POWER GENERATED IN THE SECOND PHOTOACT OF PHOTOSYNTHESIS.

Bessel Kok and E. Anne Datko (Martin Marietta Corp., Martin Co., Research Institute for Advanced Studies, Baltimore, Md.). Plant Physiology, vol. 40, Nov. 1965, p. 1171-1177. 16 refs. National Institutes of Health Grant No. PH 43-63-36; Contracts No. AF 49(638)-947; No. NASw-747.

Comparison of the reducing power of cell-free preparations of Bishop's *Scenedesmus* mutant no. 8 and the wild-type strain. The results of tests with various substrates are said to indicate that the quantum yield of photoreduction is intrinsically lower in the mutant than in the wild-type algae. It is found that the mutant reduces benzoquinone and ferricyanide with a much higher quantum efficiency than it exhibits in the case of the reduction of methyl viologen. A comparative study of oxidants having different normal potentials is made, as a result of which a distinct transition from high to low quantum yield is found to occur at a potential value of $\approx +0.18$ volt. It is assumed that this potential is equal or close to the normal potential of the primary photoreductant generated in photoact II of the two-stage photosynthesis. A.B.K.

A66-22976

INDEPENDENCE OF APPROACH AND ESCAPE REACTIONS TO ELECTRICAL STIMULATION OF THE BRAIN.

Elliot S. Valenstein (Fels Research Institute, Yellow Springs, Ohio).

Journal of Comparative and Physiological Psychology, vol. 60, no. 1, 1965, p. 20-30. 24 refs.

National Institutes of Health Grant No. MH-4529; Grant No. NSG-437.

The relative importance of neural site and experimental conditions in determining motivational direction (positive or negative) produced by electrical stimulation of the brain was evaluated. The predominant role of the neural site was indicated by administering hypothalamic and tegmental stimulation to rats in an experimental situation equally suitable for exhibition of approach or escape behavior and by correlation of behavior and histological analysis. Attempts to modify the effects of aversive stimulation by pairing hypothalamic and tegmental stimulation had little effect. Results suggest considerable stability of reinforcing consequences of stimulation of specific neural sites. Under specific stimulus conditions, positive (hypothalamic) stimulation dominated the effects of an aversive (tegmental) stimulus; the first stimulus in a series of alternating positive and negative brain stimuli was predominant. (Author)

A66-22987

NEW YORK ACADEMY OF SCIENCES, CONFERENCE ON FORMS OF WATER IN BIOLOGIC SYSTEMS, NEW YORK, N.Y., OCTOBER 5-8, 1964, PAPERS.

Conference sponsored by the New York Academy of Sciences, NASA, and the Navy.

Edited by H. E. Whipple.

New York Academy of Sciences, Annals, vol. 125, Oct. 13, 1965, 524 p.

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A66-22989

THE PHYSICAL STATE OF WATER IN LIVING CELL AND MODEL SYSTEMS.

Gilbert Ning Ling (Pennsylvania Hospital, Div. of Medicine, Dept. of Neurology, Dept. of Molecular Biology, Philadelphia, Pa.).

(New York Academy of Sciences, Conference on Forms of Water in Biologic Systems, New York, N.Y., Oct. 5-8, 1964, Paper.) New York Academy of Sciences, Annals, vol. 125, Oct. 13, 1965, p. 401-417. 41 refs.

National Institutes of Health Grant No. GM-K3-19,032; Contract No. Nonr-1-2060-66.

Discussion of analyses in which equilibrium distributions of nonelectrolytes and ions were chosen as the pertinent properties and strong electrolyte solutions, $\text{Cu}_2\text{Fe}(\text{CN})_6$ gel, and, in particular, collagen from carp's swim bladder and sheep's wool were used as models. Nonelectrolytic data are included in the presentation in order to bring into focus additional and different facets of the problem. M.M.

A66-22990

SOLUTE BEHAVIOR IN TIGHTLY CROSS-LINKED DEXTRAN GELS.

N. V. B. Marsden (Uppsala, University, Institute of Physiology, Uppsala, Sweden).

(New York Academy of Sciences, Conference on Forms of Water in Biologic Systems, New York, N.Y., Oct. 5-8, 1964, Paper.) New York Academy of Sciences, Annals, vol. 125, Oct. 13, 1965, p. 428-457. 65 refs.

Research supported by the Swedish Medical Research Council; Grant No. AF EOAR 64-33.

Description of the behavior of some nonelectrolytes and hydroxy and fluorobenzoates on elution through columns of tightly cross-linked dextran. The nonelectrolytes studied were (1) acyclic polyols, (2) aldose sugars, (3) n-alcohols, and (4) alkanediols and some miscellaneous solutes including urea and thiourea. The acyclic polyols showed a simple inverse relationship between the distribution coefficient K_d and molecular size. The aldoses, although exhibiting considerable irregularity in their K_d values, also appeared to have basically the same relationship as the polyols. The pattern among the alkanediols resembled that of the n-alcohols. M.M.

A66-22991

INTRACELLULAR WATER STRUCTURE AND MECHANISMS OF CELLULAR TRANSPORT.

Oscar Hechter (Worcester Foundation for Experimental Biology, Shrewsbury, Mass.).

(New York Academy of Sciences, Conference on Forms of Water in Biologic Systems, New York, N.Y., Oct. 5-8, 1964, Paper.)

New York Academy of Sciences, *Annals*, vol. 125, Oct. 13, 1965, p. 625-646. 79 refs.

Research supported by the Commonwealth Fund and the Ittleson Family Foundation.

Discussion of two opposing concepts of cellular transport and of their present status. It is noted that, upon analysis, both ideas are shown to be right in part; and both partially wrong. It is pointed out that the proponents of the plasma membrane thesis of transport were wrong in that they neglected the role of the cell interior; the holists were wrong in their deemphasis of the plasma membrane and of intracellular membranes generally. It is concluded that, if one considers that membrane systems throughout the cell are involved in transport, and that cells exhibit diversity as well as uniformity, a pluralistic resolution is achieved. M.M.

A66-22992

SUMMATION AND GENERAL DISCUSSION.

Humbert Fernández-Morán (Chicago, University, Chicago, Ill.).

(New York Academy of Sciences, Conference on Forms of Water in Biologic Systems, New York, N.Y., Oct. 5-8, 1964, Paper.)

New York Academy of Sciences, *Annals*, vol. 125, Oct. 13, 1965, p. 739-753. 33 refs.

National Institutes of Health Grants No. B-2460; No. C-3174; No. NB-04267; AEC Contract No. AT (30-1)-2278; Grant No. NSG-441-63.

Discussion of the following fundamental questions considered throughout the conference papers: (1) what forms of structured or ordered water are conceivable in biological systems in the light of our present knowledge; (2) what role would such ordered water structures play; (3) what would be the interrelationship with the organized macromolecular system which is considered to be one of the most distinctive features of life; and (4) how can we detect ordered water in biologic systems and what methodological approaches are feasible. It is concluded that beyond its fundamental role as a structural matrix of life, water may be endowed with an equally important, and yet more subtle role, namely as mediator of information and energy transfer at the molecular level in biologic systems. M.M.

A66-23003

MINIMUM METABOLIC REQUIREMENTS FOR ASTRONAUTS.

David E. Dudenhoefer.

Weight Record, vol. 65/66-2, Dec. 1965, p. 19-27. 11 refs.

Consideration of various aspects of extraterrestrial environments in order to develop a method of calculating more realistic values for the metabolic requirements for astronauts. A revised work regime was selected as a basis for calculations which indicate that 2500 cal/day are sufficient, and hence previous values, used throughout the technical literature, are excessive. If this conclusion is correct, the requirements for the life support system can be lowered, with consequent weight saving. F.R.L.

A66-23047

CERTAIN DYNAMIC CHARACTERISTICS OF THE OPERATOR WHEN TRACKING UNDER CONDITIONS OF SPACEFLIGHT ON BOARD THE SPACESHIP "VOSKHOD 2" [NEKOTORYE DINAMICHESKIE KHAARAKTERISTIKI OPERATORA PRI SLEZHENII V USLOVILAKH KOSMICHESKOGO POLETA NA KORABLE "VOSKHOD-2"].

P. I. Beliaev, A. A. Leonov, V. A. Popov, L. S. Khachatur'iants, and V. K. Filosofov.

Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 137-143. 12 refs. In Russian.

Consideration of the effect of various factors, including spaceflight, on certain dynamic characteristics of the human operator in a model tracking system. It is shown that the quality of in-flight tracking by the operator is reduced relative to on-the-ground conditions. However, it is noted that, on the whole, the tracking quality does not suffer serious changes under conditions of an actual 24-hour spaceflight, including Leonov's sortie into open space.

A.B.K.

A66-23048

ENDOGENOUS FORMATION OF CARBON MONOXIDE AND ITS SIGNIFICANCE IN A CLOSED ECOLOGICAL SYSTEM [ENDOGENNOE OBRAZOVANIE OKISI UGLERODA I EGO ZNACHENIE V ZAMKNUTOI EKOLOGICHESKOI SISTEME].

L. A. Tiunov and V. V. Kustov.

Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 144-150. 67 refs. In Russian.

Survey of the literature on endogenous formation of carbon monoxide and the oxidation and fixation of CO in animal and plant tissues. Attention is drawn to the significance of these processes in ecological cycles which can be simulated in life-support systems of spaceships. Studies are made of the endogenous formation of CO in mammals, the mechanism of endogenous formation of CO during the catabolism of hemoglobin, the endogenous formation of CO during the action of ionizing radiation, and the formation of CO by plants.

A.B.K.

A66-23049

RESULTS OF THE PREFLIGHT AND POSTFLIGHT MEDICAL EXAMINATION OF THE CREW MEMBERS OF THE SPACECRAFT "VOSKHOD" [REZULTATY PREDPOLETNOGO I POSLEPOLETNOGO MEDITSINSKOGO OBSLEDOVANIYA CHLENOV EKIPAZHA KOSMICHESKOGO KORABLIA "VOSKHOD"].

P. V. Buianov, V. V. Kovalev, V. G. Terent'ev, E. A. Fedorov, and G. F. Khlebnikov.

Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 151-155. In Russian.

Discussion of some physiological data on the crew of the spacecraft Voskhod 1 (1964 65A) obtained during preparations for the flight and after its completion. The results of the postflight medical are compared with data from the preflight examinations and with the results of examinations conducted during the cosmonauts' training period.

R.A.F.

A66-23050

EFFECT OF SPACEFLIGHT FACTORS OF THE SPACECRAFT-SATELLITE "VOSKHOD" ON THE MICROSPORES TRADESCANTIA PALUDOSA [VLIANIE FAKTOROV KOSMICHESKOGO POLETA NA KORABLE-SPUTNIKE "VOSKHOD" NA MIKROSPORY TRADESCANTIA PALUDOSA].

N. L. Delone, B. B. Egorov, and V. V. Antipov.

Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 156-161. In Russian.

Discussion of some biological experiments conducted with stalks of Tradescantia paludosa on the flight of the Voskhod 1 (1964 65A). Analysis of the chromosome configuration and the impairment of the mitosis mechanism in the cells is seen to confirm an earlier hypothesis that the two effects result from different groups of causes.

R.A.F.

A66-23055

MODELING THE BIOLOGICAL EFFECT OF A DEPTH DOSE OF A MONOENERGETIC FLUX OF PROTONS [MODELIROVANIE BIOLOGICHESKOGO EFFEKTA GLUBINNOI DOZY MONOENERGETICHESKOGO POTOKA PROTONOV].

V. S. Morozov, V. S. Shashkov, and B. I. Davydov.

Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 172-174. 6 refs. In Russian.

Results of an experimental study of the biological effects of bombardment by protons of energy 120 Mev. Mice were irradiated in a synchrocyclotron, using the technique described by

Afanas'ev, et al. in 1964. Some of the animals had been given injections of a protective preparation. The survival of the mice after irradiation is plotted and discussed. R. A. F.

A66-23082

ON THE MEASUREMENT OF HUMAN POWER.

Berl W. Owens (Washington, University, College of Engineering, Seattle, Wash.) and Glenn Latta.

Trend in Engineering, vol. 18, Jan. 1966, p. 21-27. 16 refs.

Investigation of the efficiency of human beings producing power by tramping, hand cranking; and lateral pumping modes. The rate at which humans consume oxygen to burn body fuels is said to be more sensitive than heart rate as an indicator of the human cost of producing power. Measurements of power produced, oxygen consumption, and ventilation of three subjects selected for special arrangements of the three modes are given. Tramping is indicated to be the most efficient method of human power production. B. B.

A66-23100

HUMAN FACTORS IN ENGINEERING. I - MAN IN THE MAN-MADE ENVIRONMENT.

Nilo Lindgren.

IEEE Spectrum, vol. 3, Mar. 1966, p. 132-139. 15 refs.

This introductory article describes something of the origin, setting, and evolution of human factors engineering as an organized discipline, and provides an overview of some of its major ramifications. It finds that despite the parochial military auspices under which the work began, HFE now encompasses a bewildering diversity of subjects and aims. It traces the development of the man-machine system concept (central to much human factors thinking), discusses the comparative roles of psychology and engineering, and, in the broadest sense, discusses the role of the human factors engineer vis-à-vis the question of man in the man-made environment. In conclusion, it asks whether or not there may be more to the HFE "name" problem than meets the eye. (Author)

A66-23171

SPACECRAFT STERILIZATION - IMMACULATE VOYAGER WILL VISIT MARS.

Machine Design, vol. 38, Mar. 3, 1966, p. 106-111.

Description of a planetary lander which will be subject to an interplanetary quarantine agreed on by the USSR and the U.S., and which will be launched from the U.S. The stringent sterilization procedures will, hopefully, assure that no terrestrial organism contaminates the Martian surface. The vehicle will carry an automated biological laboratory to perform life-detection studies on Mars. Preliminary design has been heavily influenced by sterilization requirements. F. R. L.

A66-23195

DISTRIBUTION OF CHLOROPHYLLS IN CHLOROPLAST FRAGMENTS.

J. A. Gross, A. M. Shefner, and M. J. Becker (Illinois Institute of Technology, Research Institute, Life Sciences Research Div., Chicago, Ill.).

Nature, vol. 209, Feb. 5, 1966, p. 615. 9 refs.

Research supported by the Illinois Institute of Technology.

Experimental study of the distribution of chlorophylls in mechanically fragmented spinach chloroplasts. The chloroplasts are fragmented by sonication in an aqueous suspension rather than by using digitonin. The fractionated by differential configuration. Then fractions (CF) are designated by subscripts indicating the centrifugal force range used to sediment the particular fraction. Chlorophyll content was assayed in 80% acetone and computed according to Arnon's equations. It is found that the highest chlorophyll a to chlorophyll b ratio occurred in CF₇₀₋₁₄₅, which corresponds to Boardman and Anderson's 50,000 to 144,000 g fraction. Other correspondences of fractions are also given. It is found that preliminary investigations on small chloroplast particles sedimenting at 173,000 g from CF₁₄₅ spt (supernatant) also showed a differential distribution of chlorophyll content; and these small fragments, termed polyquantasomes, are photoactive. It is concluded that although the results are not clear, Boardman and Anderson's assignment of their 50,000 to 144,000 g fraction to system 1 and

of the remaining fractions to system 2 cannot be accepted unequivocally. It is considered apparent that additional study of small-particle fractions is essential to firmly establish that the chlorophyll of spinach chloroplasts is associated with two different particles representing the two pigment systems. M. L.

A66-23250

FLIGHT DECK DISPLAY FOR FUTURE AIRCRAFT PROJECTS.

Milton Brown (Bendix Corp., Eclipse-Pioneer Div., Instrumentation Laboratory, Teterboro, N.J.).

(British Air Line Pilots Association, Symposium on Flight Deck Displays, London, England, Nov. 23-25, 1965, Paper.)

Aircraft Engineering, vol. 38, Feb. 1966, p. 18-22.

Discussion of various flight director instrument displays that are now available, and of some experimental types. Development of such displays is primarily due to FAA requirements for the Category II "see to land" system. The display requirements are two independent flight director systems or one flight director system with dual displays and an automatic approach coupler. Details of various systems are described and they are compared and evaluated. Emphasis is placed on the case of reading of vertical moving tapes as compared to conventional dial and pointer instrumentation. F. R. L.

A66-23371

THE RELEVANCE OF VIGILANCE RESEARCH TO AEROSPACE MONITORING TASKS.

Austin W. Kibler (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Behavioral Sciences Laboratory, Wright-Patterson AFB, Ohio).

Human Factors, vol. 7, Apr. 1965, p. 93-99. 12 refs.

The basic task dynamics of classical vigilance research are outlined and compared with those of representative contemporary monitoring tasks. It is argued that, while monitoring functions are increasing in modern technology, those particular functions on which the classical vigilance research paradigm is based are declining. The difficulty of generalizing from simple laboratory vigilance tasks to the generally more complex applied monitoring functions is discussed. It is suggested that the results of classical vigilance research may not be particularly germane to contemporary monitoring problems. Recommendations for future research are given. (Author)

A66-23372

THE EFFECTS OF EXTRANEOUS STIMULATION ON VIGILANCE.

John D. Zuercher (Illinois, University, Urbana, Ill.).

Human Factors, vol. 7, Apr. 1965, p. 101-105. 20 refs.

The influence of extraneous stimulation on vigilance performance was investigated by the method of repeated threshold measurement. During part of a 48-min. vigil subjects were required to stand, stretch, and breathe deeply under one condition and to converse with the experimenter during another condition. Performance during the continuing watch improved under both conditions. The results are interpreted as evidence supporting the activation hypothesis of vigilance. (Author)

A66-23373

THE ELICITED OBSERVING RATE AND DECISION PROCESSES IN VIGILANCE.

Harry J. Jerison, Ronald M. Pickett, and Herbert H. Stenson (Antioch College, Behavior Research Laboratory, Yellow Springs, Ohio).

Human Factors, vol. 7, Apr. 1965, p. 107-128. 16 refs.

Grant No. AF AFOSR 150-65; Contract No. AF 33(615)-1086.

Observers detected many more of a fixed number of signals when these were among stimuli presented at 5 per minute than when these were among stimuli presented at 30 or 60 per minute. The effect, which is associated with either the signal probability or the nonsignal stimulus density, is analyzed with conventional measures and with measures from the theory of signal detectability (TSD). The TSD measures were used to define several possible modes of observing, and the model of vigilance based on decisions

about observing could then be related to decision processes in detection performance as considered by TSD. If a single measure of the probability of alert observing is required, the best one is the percentage of detections of the readily detectable signal of the vigilance task. However, the TSD analysis suggested various different "mixes" of modes of observing for the subgroups in this experiment, and these mixes could be specified with the help of heuristic models relating performance measures to the probability of observing. (Author)

A66-23374

PERFORMANCE SHARING IN AN AUDIO-VISUAL VIGILANCE TASK.

James J. McGrath (Human Factors Research, Inc., Los Angeles, Calif.).

Human Factors, vol. 7, Apr. 1965, p. 141-153. 16 refs. Army-Navy-supported research.

Verification of the phenomenon of performance sharing, discovered in an earlier experiment. This phenomenon is attributed to differences in signal detectability when two vigilance tasks are performed concurrently. Performance on a vigilance display presenting easily detectable signals was shown to be enhanced by requiring the observer to monitor simultaneously another display, presenting difficult signals via a different sensory modality. Several theoretical approaches to the explanation of the phenomenon are discussed, and implications for display design and research are suggested. M. F.

A66-23375

EFFECTS OF NOISE AND OF SIGNAL RATE UPON VIGILANCE ANALYSED BY MEANS OF DECISION THEORY.

Donald E. Broadbent and Margaret Gregory (Medical Research Council, Applied Psychology Research Unit, Cambridge, England). Human Factors, vol. 7, Apr. 1965, p. 155-162. 14 refs.

A vigilance task was performed in which regular flashes of light were monitored for an occasional flash of greater brightness. Following every flash a decision of signal present, signal absent, or doubtful had to be recorded. Two separate groups received high and low signal rates with a variety of the task in which the flashes occurred only on one lamp; another group received a high signal rate divided between three simultaneously flashing lights. An analysis in terms of decision theory showed that detrimental changes during the watch period were entirely attributable to movement of the subject's criterion for reporting a signal: his sensitivity to the signals if anything improved during the work period. In addition, criterion changes in the presence of intense noise occurred at high signal frequencies, even when only one source of information was involved, thus showing that division of attention between different sources is not essential for harmful effects of noise. In addition, criteria under quiet conditions were different at different signal rates. (Author)

A66-23376

THE EFFECTS OF SIGNAL AND RESPONSE COMPLEXITY ON EIGHTEEN HOURS OF VISUAL MONITORING.

William E. Montague, Carl E. Webber, and Jack A. Adams (Illinois, University, Urbana, Ill.).

Human Factors, vol. 7, Apr. 1965, p. 163-172. 24 refs. Contract No. AF 41(609)-1481.

Subjects monitored a complex display composed of three rows of four digital display boxes each containing a constant reference number. A change in the number lasting six seconds was the signal to be detected. Signals occurred for different groups of subjects at rates of either 16 or 64 per hour. Response complexity was varied by having some subjects merely report the change while others evaluated the size of the change. Four groups of 15 subjects received a different combination of rate and complexity. Neither rate nor complexity influenced performance. All groups showed significant vigilance decrement during the session. The magnitude of the decrement was relatively trivial, however, and in substantial agreement with other studies. In complex tasks man seems to be an adequate monitor over rather extended time periods. (Author)

A66-23377

EFFECTS OF KNOWLEDGE OF RESULTS AND DIFFERENTIAL MONETARY REWARD ON SIX UNINTERRUPTED HOURS OF MONITORING.

William E. Montague and Carl E. Webber (Illinois, University, Urbana, Ill.).

Human Factors, vol. 7, Apr. 1965, p. 173-180. 19 refs. Contract No. AF 41(609)-1481.

The effects of knowledge of results (KR) and monetary reward on six hours of uninterrupted monitoring of a complex visual display were examined. Comparisons were made among groups receiving: no KR about response adequacy, KR, KR plus monetary reward or penalty determined by response adequacy, and KR plus reward in practice but not during the criterion session. In addition, comparison was made between the no-KR group and a similar one run by Webber and Adams (1964) where a rest had been given after three of six hours monitoring. All groups showed performance decrements of small magnitude. The manipulation of KR and reward failed to deter decrement. Reward in addition to KR did enhance overall performance, however. KR alone did not facilitate performance, contrary to results from other studies. Training under KR plus reward did not enhance criterion performance when no KR or reward was provided. In support of previous research, man's monitoring capabilities over extended time periods seem adequate for modern systems. (Author)

A66-23499

MINIATURE LONG-LIFE TEMPERATURE TELEMETRY SYSTEM.

Thomas B. Fryer, Gordon J. Deboo, and Charles M. Winget (NASA, Ames Research Center, Instrumentation Div. and Environmental Biology Div., Moffett Field, Calif.).

Journal of Applied Physiology, vol. 21, Jan. 1966, p. 295-298.

A miniature telemetry system including transmitter and sensor suitable for implanting in small animals to measure their deep body temperature has been designed. A compensating bridge circuit is used to achieve a stable and accurate measurement system. The high performance, coupled with the small size and long battery life, makes the device valuable for long-term observation of an animal's temperature rhythms. The device has a self-contained miniature battery that provides approximately 3600 hr operation. (Author)

A66-23538

THE RELEASE OF POLYPEPTIDE CHAINS FROM RIBOSOMES IN CELL-FREE AMINO ACID-INCORPORATING SYSTEMS BY SPECIFIC COMBINATIONS OF BASES IN SYNTHETIC POLYRIBONUCLEOTIDES.

Mituru Takanami and Yonhon Yan (California, University, Space Sciences Laboratory, Berkeley, Calif.).

National Academy of Sciences, Proceedings, vol. 54, Nov. 1965, p. 1450-1458. 16 refs.

National Institutes of Health Grant No. GM-12932-01; Grant No. NsG-479.

Experimental study of the behavior of synthetic polyribonucleotides of various base compositions in cell-free amino acid-incorporating systems obtained from *E. coli*. It was found that a significant release of polypeptide chains into the supernatant fraction was obtained only when the polynucleotides contained uracil and adenine. The presented findings agree with the proposal by Brenner. The experiments do not supply conclusive information on the base sequences, but the probable chain-terminating triplets also appear to agree with Brenner's findings. M. L.

A66-23539

OCCURRENCE OF BIOGENIC STERANES AND PENTACYCLIC TRITERPANES IN AN EOCENE SHALE (52 MILLION YEARS) AND IN AN EARLY PRECAMBRIAN SHALE (2.7 BILLION YEARS) - A PRELIMINARY REPORT.

A. L. Burlingame, Pat Haug, Theodore Belsky, and Melvin Calvin (California, University, Space Sciences Laboratory and Lawrence Radiation Laboratory, Berkeley, Calif.).

National Academy of Sciences, Proceedings, vol. 54, Nov. 1965, p. 1406-1412. 23 refs.

AEC-supported research; Grant No. NsG-101.

Experimental investigation reporting the isolation and identification of the C_{27} , C_{28} , and C_{29} -steranes and a C_{30} -pentacyclic triterpane from the branched-cyclic alkane fraction of

shale rock from the Green River Formation (Eocene age, about 52×10^6 years) at Rifle, Colorado. Conditions of the separation (performed by gas-liquid chromatography and mass spectrometry) are described. A series of chromatograms and mass spectrograms are presented, and a comparison is made with a study of the Soudan Iron Formation of Minnesota, which is considered the oldest carbonaceous rock thus far known on the North American continent (isotopically dated at 2.7 billion years). It is concluded that the presence of steranes (and probably pentacyclic triterpanes) in the Soudan shale provides further evidence for the presence of life processes sufficiently complex to require an enzymatic template and in vivo polyisoprenoid cyclizations at the 2-billion-year mark in terrestrial chronology. M.L.

A66-23567

IMPULSES ORIGINATING IN THE REGION OF DENDRITES.

P. D. Wall (Massachusetts Institute of Technology, Dept. of Biology and Research Laboratory of Electronics, Center for Communication Sciences, Cambridge, Mass.).
Journal of Physiology, vol. 180, 1965, p. 116-133. 26 refs.
Research supported by Bell Telephone Laboratories and Teagle Foundation; Contracts No. DA-36-039-AMC-03200(E); No. AF 33(615)-1747; NSF Grant No. GP-2495; National Institutes of Health Grants No. MH-04737-04; No. NB-04897-02; Grants No. NSG-496; No. AF AFOSR 591-64.

Experimental study of the nature of impulses which can be recorded in the dorsal part of the dorsal horn of the spinal cord. It is shown that evoked spikes can be recorded within Rexed's laminae 2 and 3 (the substantia gelatinosa), but that spontaneous spikes are only recorded when the electrode reaches lamina 4. Small extracellular action potentials can be recorded in the substantia gelatinosa. They are not produced by either the terminals of afferent fibers or by the small cells of the substantia gelatinosa. It is shown that these spikes have exactly the same qualitative properties as those evoked in the cell bodies of cells in lamina 4. Continuous recordings can be made from the dendritic region to the cell body region of these cells. Spontaneous activity is only present in the cell body region, but when the receptive field of the cell is stimulated, impulses are initiated in the dendrites and are not conducted back into the dendrites from the cell body. It is tentatively concluded that the region from which impulses can be initiated extends up into the dendrites as the intensity of bombardment and firing of the cells increases. M.L.

A66-23568

THE COUPLING OF BIOLOGICALLY ACTIVE MOLECULES TO INSOLUBLE POLYMERS - ANTIBODY ON CELLULOSE.

H. H. Weetall and N. Weliky (California Institute of Technology, Jet Propulsion Laboratory, Space Sciences Div., Chemistry Section, Pasadena, Calif.).

Biochimica et Biophysica Acta, vol. 107, 1965, p. 150-152. 13 refs.

Study of a method for coupling antibody globulin to a diazotized aminoaryl derivative of carboxymethyl-cellulose to form an immunoadsorbent which specifically retains and releases a specific antigen. It is pointed out that each of these insoluble antibody derivatives was found to exhibit activity and to remove the homologous antigens from solution. In the method described, carboxymethyl-cellulose was coupled to benzidine in the presence of N,N'-dicyclohexylcarbodiimide. The free amino groups on the aminoaryl-cellulose were diazotized and the resulting material added to gamma-globulin previously precipitated from pooled sera of rabbits immunized against human gamma-globulin. A column was prepared using the cellulose coupled to the immune globulins. After washing with a 1% NaCl solution, a solution of human gamma-globulin was passed through the column, followed by 1% NaCl until no protein was detectable in the effluent spectrophotometrically. To release the antigen from the antigen-antibody complex, the column was eluted with 1% NaCl adjusted to pH 2.3 with HCl. The eluted protein was determined using the Lowry method. An experiment confirming the specificity of the method was also performed and is described. M.L.

A66-23640

EXOBIOLOGY - MAN IN SPACE.

Harrie Massey (London, University, University College, Dept. of Physics, London, England).

(Contemporary Physics, vol. 6, June 1965, p. 321-337.)

IN: SPACE TRAVEL AND EXPLORATION.

H. S. W. Massey (London, University, University College, Dept. of Physics, London, England).

London, Taylor and Francis, Ltd., 1966, p. 93-109.

A66-23645

OCULOMETRY.

John Merchant (Honeywell, Inc., Radiation Center, Military Products Group, Boston, Mass.).

(Society of Photo-optical Instrumentation Engineers, Technical Symposium, 10th, San Francisco, Calif., Aug. 16-20, 1965, Paper.)
SPIE Journal, vol. 4, Dec. 1965-Jan. 1966, p. 58-64. 17 refs.
Contract No. NASw-1159.

Review of the concept of eye control, as an alternate or supplement to hand control, in relation to the basic method of operation of the human eye system. It is shown that the pointing of the eyeball is an important, not incidental, part of the visual process. For this reason position information can, theoretically, be derived from a measurement of eye direction, in the same general way that position information is taken from gimbal pickoffs on a scanning radar antenna. It is noted that eye control is a potential method of extending the capability of the human operator to function in certain man/machine systems because it eliminates, or considerably reduces, the need for manual action. The operator's task is reduced, essentially, to normal visual perception only. M.M.

A66-23753

INVESTIGATION OF AIRCRAFT CREW FATIGUE ON LONG-DISTANCE FLIGHTS WITH JET AIRCRAFT [UNTERSUCHUNGEN ZUR BELASTUNG DES BORDPERSONALS AUF FERNFLÜGEN MIT DÜSENMASCHINEN].

K. E. Klein, H. Brünner, and S. Ruff (Deutsche Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bad Godesberg, West Germany).

Zeitschrift für Flugwissenschaften, vol. 14, Feb. 1966, p. 109-121. 41 refs. In German.

Comparative fatigue measurements for aircraft crew members on regular transatlantic flights and a control group engaged in sedentary activities without change of place. The crews were aboard Boeing 707 or 720 aircraft flying directly from Frankfurt, West Germany, to New York with a return flight to Cologne or Munich, West Germany. The parameters measured included pulse rate, temperature, and heartbeat. The results of the tests are tabulated and analyzed. It was found that there exists a possibility of impairment of flight safety under stressful flights during certain hours of the day. D.P.F.

A66-23794

EVIDENCE OF EXTRATERRESTRIAL LIFE [ÜBER DEN NACHWEIS EXTRATERRESTRISCHEN LEBENS].

Hans Swart.

Astronomie und Raumfahrt, no. 6, 1965, p. 161-171. 10 refs. In German.

Review of work currently being done to determine whether extraterrestrial life exists in the solar system. Only Mars is considered capable of supporting even lower forms of life. Various automatic systems currently being developed in the U. S. for use with the Voyager spacecraft are intended to soft-land on the Martian surface, gather dust samples from the Martian atmosphere, or collect samples of the Martian soil and examine them for microorganisms. The furthest developed of these systems are the "Gulliver" radioisotope experiment, the "Multivator" automatic biochemical testing apparatus and a TV-microscope. The first launch attempt is expected to be with a Saturn-IB/Centaur, not before 1969. R.A.F.

A66-23805

MILITARY FLYING AND EXPERIMENTAL PSYCHOLOGY. II [PILOTAGE MILITAIRE ET PSYCHOLOGIE EXPERIMENTALE. II].

A. de Brissin and J. Brémont.

Forces Aériennes Françaises, vol. 20, Mar. 1966, p. 299-318. In French.

Study of those elements which, within the framework "recruitment-training-service," affect the quality of success, and make it possible to improve training. Careful selection of aircrew personnel ensures a notable reduction in failures in school, and the overall cost of training. Rationalization of training depends on the organization of programs and lessons, the objectivity of grading on the ground and in flight, teaching methods, the influence of environment and, notably, the influence of the school staff on the development of motivation. Use of a psychosociological model to predict success or failure is discussed.

F. R. L.

A66-23917**A DEMONSTRATION OF ION-EXCHANGE PHENOMENA IN PHOSPHOLIPID MONO-MOLECULAR FILMS.**

Eduardo Rojas (U.S. Public Health Service, National Institutes of Health, National Institute of Neurological Diseases and Blindness, Laboratory of Biophysics, Bethesda, Md.), J. Y. Lettvin, and W. F. Pickard (Massachusetts Institute of Technology, Research Laboratory of Electronics, Cambridge, Mass.).

Nature, vol. 209, Feb. 26, 1966, p. 886, 887. 16 refs.

Research supported by the Bell Telephone Laboratories; Grant No. NSG-496; Contracts No. AF 33(615)-1747; No. DA-36-039-AMC-03200(E).

Experimental data based on the use of monomolecular films of phosphatidylserine as a structural model of the cell membrane for the displacement of Ca^{++} by Li^+ , Rb^+ , and Cs^+ to determine if these monolayers discriminate between Li^+ , Rb^+ , and Cs^+ . The amount of Ca^{++} adsorbed by the film in the presence of different concentrations of lithium chloride, rubidium chloride, and cesium chloride in the hypophase was taken as a measure of the efficiency of displacement of Ca^{++} by Li^+ , Rb^+ , and Cs^+ . The curve of calcium displacement as a function of the hypophase competing cation concentration shows that Li^+ , Rb^+ , and Cs^+ each displace the same number of calcium ions from the polar groups of the phosphatidylserine monolayer at any given concentration. Thus, there is no discrimination among these monovalent cations. It is also shown that La^{+++} displaces Ca^{++} from the binding sites at cell surfaces.

D. P. F.

A66-23920**AEROSOL DEPOSITION IN THE LUNGS OF SPACE TRAVELLERS.**

D. C. Muir (London, University, London School of Hygiene and Tropical Medicine, London, England).

Nature, vol. 209, Feb. 26, 1966, p. 921.

Consideration of the mechanisms for the elimination of aerosol from the human respiratory tract and an evaluation of the modifications likely to result in these mechanisms from the effects of prolonged exposure to reduced gravitational fields. Inertial impaction, sedimentation by gravity, and diffusion due to Brownian movement are the mechanisms by which inhaled particles are deposited on the walls of airways. Protection against such deposition is offered by a ciliary mechanism for particle removal in the upper air channels. A reduced gravitational field, such as that prevailing on the moon, may allow the access of large particles to the nonciliated lower alveolar regions of the lung. This effect may constitute a hazard to astronauts.

D. P. F.

A66-23921**RAPID ACQUISITION OF RADAR TARGETS FROM MOVING AND STATIC DISPLAYS.**

Charles W. Simon (Hughes Aircraft Co., Aerospace Group, Culver City, Calif.).

Human Factors, vol. 7, June 1965, p. 185-205. 7 refs.

Aerial-reconnaissance radar imagery can be presented to an observer for near-real time interpretation in two ways: as a continuously moving display or in discrete, static steps. Both were studied in a laboratory experiment designed to determine their effect on the probability and speed of target acquisition. The results indicated: (1) no significant differences in the number of real or false targets acquired, (2) significantly less time required to find a target on the moving display, and (3) the time difference increased as targets became more difficult to recognize and as the available observation time increased. The relevance of this study for equipment design considerations and the generality of the results to other near-real-time reconnaissance missions are discussed. It is concluded that even among a wide variety of conditions not included

in this study, where targets are of simple, well-defined patterns capable of recognition with little study, the moving presentation mode - in balance - will result in better target acquisition performance. (Author)

A66-23922**EFFECTS OF ADDED WORK LOAD ON COMPENSATORY TRACKING FOR MAXIMUM TERRAIN FOLLOWING.**

Richard A. Monty and William J. Ruby (Cornell Aeronautical Laboratory, Inc., Human Sciences Section, Buffalo, N. Y.).

Human Factors, vol. 7, June 1965, p. 207-214. 7 refs.

Contract No. N0W-63-0608-c.

The relative merits of presenting each of two command signals (δ_e , the elevator deflection angle, and γ , the aircraft flight-vector angle) on a compensatory display for manual control of a simulated aircraft on a terrain-following mission were examined. It was found that imposing additional work loads on the pilot led to a greater decrement in tracking performance with the γ command than with the δ_e command. Further, the work load task itself was performed with greater proficiency while tracking with the δ_e command. The apparent merits of the δ_e command warrant further investigation. (Author)

A66-23923 #**APPARENT MOTION IN GEOMETRIC DEPTH.**

R. E. Wienke and W. C. Steedman (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio).

Human Factors, vol. 7, June 1965, p. 215-218. 6 refs.

The ability to detect small excursions of apparent movement of a point light source was investigated. Apparent movement was achieved by alternately presenting a point source in two different planes. The presentations, each lasting about 500 msec, had an overlap of approximately 8 msec. Using seven subjects, the limen for apparent motion was a stimulus separation of 43.9 mm, which is a visual angle of $1' 21''$. Possible application of the effect in a highly precise visual guidance system is discussed in light of the results. (Author)

A66-23924 #**A TEST OF THE EFFECTIVENESS OF SENSOR LINES SHOWING LINKAGES BETWEEN DISPLAYS AND CONTROLS.**

Alphonse Chapanis and Gregory R. Lockhead (Johns Hopkins University, Dept. of Psychology, Baltimore, Md.).

Human Factors, vol. 7, June 1965, p. 219-229. 6 refs.

Contracts No. Nonr-248(55); No. Nonr-4010(03).

This experiment tested the effectiveness of sensor lines (heavy lines drawn on a control panel to show the linkages between displays and controls) on simple panels made up of lights (the displays) and keys (the controls). The three independent variables were (1) size of panel (two sizes were tested), (2) compatibility of the display-control linkages (a maximally compatible and a highly incompatible arrangement were used), and (3) the presence or absence of sensor lines. Eight panels were constructed to test all possible combinations of these three independent variables. Eighty male subjects in all (ten for each panel) were used. The subject's task was to push the appropriate key as soon as a light had been turned on. Each subject was given 240 consecutive trials on the panel to which he was assigned. Dependent measures were: time to first response, time to correct response, and errors. The results show that it is more important to make the linkages between displays and controls compatible than it is to use sensor lines which show schematically the linkages between displays and controls. Sensor lines appear to have a limited kind of usefulness for panels of the type tested here: The lines improved performance only when the linkages between displays and controls were not compatible. (Author)

A66-23925**RESPONSE-RESPONSE COMPATIBILITY EFFECTS IN A TWO-HAND POINTING TASK.**

James R. Peterson (Honeywell, Inc., Minneapolis, Minn.).

Human Factors, vol. 7, June 1965, p. 231-236.

ARPA-supported research; Contract No. AF 49(638)-1235.

An experiment was conducted to determine whether or not response-response compatibility effects were present in a simple

perceptual-motor task where simultaneous two-hand pointing responses were required. The results indicate that both response precision and movement time are affected by the particular combinations of responses used. The results are interpreted as supporting the contention that R-R compatibility effects do exist - even in quite simple perceptual-motor tasks. A distinction is made between Stimulus-Response (S-R) compatibility effects and Response-Response (R-R) compatibility effects. (Author)

A66-23926

DO LARGE SHARED DISPLAYS FACILITATE GROUP EFFORT?

Sidney L. Smith (Mitre Corp., Bedford, Mass.) and Benjamin C. Duggar (Bio-Dynamics, Inc., Cambridge, Mass.).

Human Factors, vol. 7, June 1965, p. 237-244. 5 refs.

Contract No. AF 19(628)-2390.

Twelve four-man groups searched and counted visually displayed items. In one session, they used a large display shared in common by the group members; in another session, separate smaller displays were viewed individually. Information was presented under conditions of equal visual angle, so that these two display modes were logically equivalent. Performance was 15% faster with the large group display than with the small individual displays. There was no significant difference in error frequency. Some subjects preferred the large display, some the small. In a supplementary study, running individual subjects rather than groups, there were no differences in speed or accuracy between the display modes. This suggests that the difference in group performance time resulted from some facilitating effect of the shared display on the process of group interaction. (Author)

A66-23927

INFORMATION ASSIMILATION FROM CODED AND UNCODED INDIVIDUAL AND GROUP DISPLAYS.

Charles H. Hammer and Seymour Ringel (U.S. Army, Personnel Research Office, Washington, D.C.).

Human Factors, vol. 7, June 1965, p. 245-255. 5 refs.

This report describes two related studies designed to evaluate the effects of conspicuity coding of updated alphanumeric information and to compare the relative effects of Individual and Group displays. The amount of information presented and the amount of information updated were varied. The principal findings lend support to the incorporation and use of coding capabilities in current and proposed command systems. While findings regarding Individual vs Group displays are not conclusive, they do suggest that if uncoded updated information is presented, there may be a whole series of information assimilation tasks which can be more efficiently accomplished with Individual than with Group displays. (Author)

A66-23928

PILOT AND OBSERVER PERFORMANCE IN SIMULATED LOW ALTITUDE HIGH SPEED FLIGHT.

Ben Schohan, Harve E. Rawson, and Stanley M. Soliday (North American Aviation, Inc., Columbus, Ohio).

Human Factors, vol. 7, June 1965, p. 257-265.

Contract No. DA-44-177-TC-803.

Responses of experienced pilots and aerial observers were studied in simulated low-altitude, high-speed (LAHS) flight. The pilots "flew" three-hour surveillance missions at airspeeds of 0.4 M and 0.9 M in different degrees of simulated atmospheric turbulence. Flying ability decreased from 0.4 to 0.9 M; however, intensity of vertical accelerations did not seem to affect flying ability except at the most severe levels. Target identification was unimpaired by either turbulence or airspeed. The observers also flew three-hour missions while experiencing acceleration time histories recorded from the pilot's flights. Target identification deteriorated as airspeed increased from 0.4 to 0.9 M. Gust intensity did not affect performance of any of their tasks. Performance efficiency on all tasks did not deteriorate from beginning to end of the missions of both pilots and observers. (Author)

A66-23929

STUDIES OF HELICOPTER PILOT PERFORMANCE. I - THE ANALYSIS OF MANEUVER DIMENSIONS.

Albert Zavala, Edwin A. Locke, Harold P. Van Cott, and Edwin A. Fleishman (American Institutes for Research, Washington, D.C.).

Human Factors, vol. 7, June 1965, p. 273-283. 19 refs. Contract No. DA-49-193-MD-2632.

Measures of helicopter pilot proficiency were obtained on samples of student pilots in two training phases. Measures were based on students' performance on 16 and 12 separate maneuvers in the Primary and Basic training phases, respectively. Intercorrelations of maneuvers in each phase were subjected to factor analysis. In both phases maneuver performance could be described in terms of six or seven clearly interpretable common factors. The results were discussed in terms of the implications for understanding the structure and measurement of skilled psychomotor performance. (Author)

A66-23930

STUDIES OF HELICOPTER PILOT PERFORMANCE. II - THE ANALYSIS OF TASK DIMENSIONS.

Edwin A. Locke, Albert Zavala, and Edwin A. Fleishman (American Institutes for Research, Washington, D.C.).

Human Factors, vol. 7, June 1965, p. 285-302. 18 refs.

Contract No. DA-49-193-MD-2632.

Measures of helicopter pilot proficiency were obtained on several hundred student pilots in the Primary and Basic training phases. Measures were based on students' performance on 75 and 76 tasks (items), for the Primary and Basic phases, respectively. Intercorrelations of tasks in each phase were subjected to factor analysis. The 12 factor rotation solutions were presented in detail for each phase, and the 18 and 24 factor rotations solutions were described briefly. In almost all cases the same tasks (e.g., RPM and altitude) tended to cluster together across different maneuvers. The factors are interpreted in terms of the operations performed for each task, and the theoretical and practical implications of the findings are discussed. (Author)

A66-24227

NEW YORK ACADEMY OF SCIENCES, CONFERENCE ON ADVANCES IN BIOMEDICAL COMPUTER APPLICATIONS, NEW YORK, N.Y., JUNE 3-5, 1965, PAPERS.

New York Academy of Sciences, Annals, vol. 128, Jan. 31, 1966. 396 p.

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SIMULATION OF THE CARDIOVASCULAR SYSTEM. E. O. Attinger and Anharvedi Anné (Presbyterian Hospital; Pennsylvania, University, Philadelphia, Pa.), p. 810-829. 31 refs. [See A66-24230 12-05]

A HYBRID COMPUTER SYSTEM FOR THE MEASUREMENT AND INTERPRETATION OF ELECTROCARDIOGRAMS. Donald Wortzman, Bill Gilmore, Herbert D. Schwetman (International Business Machines Corp., Yorktown Heights, N.Y.), and Jacob I. Hirsch (New York University, New York, N.Y.), p. 876-899. 13 refs. [See A66-24231 12-05]

DEPENDENCE BETWEEN RESPONSES EVOKED IN VISUAL CORTEX. E. F. Vastola (New York, State University, Brooklyn, N.Y.), p. 914-920. 6 refs. [See A66-24232 12-04]

DETERMINISTIC TYPE WAVEFORM ANALYSIS IN ELECTROCARDIOGRAPHY. Pentti M. Rautaharju (Dalhousie University, Halifax, Canada), p. 939-954. 11 refs. [See A66-24233 12-05]

A66-24228

LINEAR AND NONLINEAR MECHANISMS OF BRAIN-WAVE GENERATION.

Donald O. Walter and W. Ross Adey (California, University, Dept. of Physiology and Dept. of Anatomy, and Center for Health Sciences, Brain Research Institute, Los Angeles, Calif.).

(New York Academy of Sciences, Conference on Advances in Biomedical Computer Applications, New York, N.Y., June 3-5, 1965, Paper.)

New York Academy of Sciences, Annals, vol. 128, Jan. 31, 1966, p. 772-780. 9 refs.

Contracts No. NAS 2-2503; No. AF 49(638)-1387; Grant No. NSG-502.

Quantitative analysis of EEGs of monkeys stimulated cyclically by whole-body vibration. Coherence functions relating brain records to the acceleration records and coherent and incoherent peaks at the shaker frequency are plotted. Some specimen findings about the brain's physiological responses to vibration, made through multivariate spectral analysis, are exhibited. It is thought that these findings depend heavily on having available a comprehensive machine system for spectral analysis by digital filtering. Records can be processed, the intensities of which differ by factors of more than 1000, and calculations can be carried as far as inverting matrices without concern for excessive leakage or error buildup. B.B.

A66-24229

FLUID BALANCE AND ELECTROLYTE DISTRIBUTION IN THE HUMAN BODY.

E. C. DeLand and Gilbert B. Bradham (RAND Corp., Santa Monica, Calif.).

(New York Academy of Sciences, Conference on Advances in Biomedical Computer Applications, New York, N. Y., June 3-5, 1965, Paper.)

New York Academy of Sciences, Annals, vol. 128, Jan. 31, 1966, p. 795-809. 17 refs.

Contract No. AF 49(638)-700.

Consideration of a mathematical model for computing the fluid and electrolyte distribution in the principal body compartments of a young 70-kg human male. The mathematical procedure simulates the physiological subsystem by incorporating all the known chemical reactions and electrochemical relations which seem necessary to establish the fluid and electrolyte distribution. An electronic computer is used to solve a large system of simultaneous equations. The model is validated in two ways: the qualitative responses of the system to chemical stress are compared with similar experiments reported in the literature, and the quantitative aspects are tested against nephrectomized animals. Generally, the results show that this simple model gives the correct qualitative responses and reasonable quantitative answers. B.B.

A66-24230

SIMULATION OF THE CARDIOVASCULAR SYSTEM.

E. O. Attinger and Antharvedi Anné (Presbyterian Hospital, Research Institute; Pennsylvania, University, School of Veterinary Medicine, and Moore School of Electrical Engineering, Bioengineering Dept., Philadelphia, Pa.).

(New York Academy of Sciences, Conference on Advances in Biomedical Computer Applications, New York, N. Y., June 3-5, 1965, Paper.)

New York Academy of Sciences, Annals, vol. 128, Jan. 31, 1966, p. 810-829. 31 refs.

U.S. Public Health Service Grants No. H-6836, No. FR-00148.

Outline of the physical properties of the cardiovascular system and of the essential characteristics of electrical analog type cardiovascular models. All of the considered models depend on the availability of computers. An analog computer which has been programmed on a digital computer and can be used for both lumped and distributed parameter models is discussed. A schema of the circulation and a diagram illustrating the massive changes in cross section along the peripheral vascular bed are given. The distribution of pressure throughout the vasculature, input impedance in a 60-lb dog as a function of frequency, and pulse-wave velocity measured through the arterial tree of a 50-lb dog are plotted. B.B.

A66-24231

A HYBRID COMPUTER SYSTEM FOR THE MEASUREMENT AND INTERPRETATION OF ELECTROCARDIOGRAMS.

Donald Wortzman, Bill Gilmore, Herbert D. Schwetman (International Business Machines Corp., Advanced Systems Development Div., Yorktown Heights, N. Y.), and Jacob I. Hirsch (New York University, Medical Center, New York, N. Y.).

(New York Academy of Sciences, Conference on Advances in Biomedical Computer Applications, New York, N. Y., June 3-5, 1965, Paper.)

New York Academy of Sciences, Annals, vol. 128, Jan. 31, 1966, p. 876-899. 13 refs.

Study of the development of a method for interpreting electrocardiograms (ECGs) by computer through use of a pattern-recognition approach which permits the interpretation of ECG's of abnormal as well as normal rhythms. The analysis system and the analog editor of the system are described and illustrated schematically, and the generation of templates representing a typical heart cycle

to serve as a standard with which to compare successive heart cycles is discussed. A program for the interpretation of the ECG's is explained, arrhythmia diagnosis is discussed, and comparisons are made between computer and manual measurements. The generation and refinement of a flow diagram of the ECG analysis program is given, and the use of the program is outlined. B.B.

A66-24232

DEPENDENCE BETWEEN RESPONSES EVOKED IN VISUAL CORTEX.

E. F. Vastola (New York, State University, College of Medicine, Brooklyn, N. Y.).

(New York Academy of Sciences, Conference on Advances in Biomedical Computer Applications, New York, N. Y., June 3-5, 1965, Paper.)

New York Academy of Sciences, Annals, vol. 128, Jan. 31, 1966, p. 914-920. 6 refs.

Analysis of the recording of the response of a large population of neuronal elements in the visual cortex of unanesthetized cats with a recent intercollicular brain stem transection with a bipolar electrode of 50 to 100 μ diam. The experimental method, which involves the output of the recording electrode being brought to an analog-to-digital conversion system which punches its output on paper tape, is described, and the resulting data are discussed. Examination of the matrices from a large number of sequences confirms the fact that the amplitudes of successive responses evoked in visual cortex are not independent of one another; strong dependence is demonstrated in responses separated by as much as 7 sec. B.B.

A66-24233

DETERMINISTIC TYPE WAVEFORM ANALYSIS IN ELECTROCARDIOGRAPHY.

Pentti M. Rautaharju (Dalhousie University, Halifax, Canada).

(New York Academy of Sciences, Conference on Advances in Biomedical Computer Applications, New York, N. Y., June 3-5, 1965, Paper.)

New York Academy of Sciences, Annals, vol. 128, Jan. 31, 1966, p. 939-954. 11 refs.

Research supported by the Medical Research Council, Canadian Heart Foundation, American Heart Association; U.S. Public Health Service Grant No. HE-04697.

Description of certain deterministic type waveform analysis techniques developed for analysis of noisy repetitive transient functions. Those techniques developed particularly for hybrid computer processing of exercise electrocardiograms and for testing the accuracy of various noise reduction methods such as transient computing are considered. Certain common errors in average transient computing are indicated, and limitations of selective sampling in analysis of the 12-lead electrocardiogram (ECG) according to the conventional analysis scheme are discussed. It is concluded that the smoothing error can be kept within satisfactory limits if the variations in the relative time point of triggering follow approximately the normal distribution and if the range of these is smaller than 20 msec. B.B.

A66-24234

PSYCHOLOGICAL REACTIONS TO AIRCRAFT NOISE.

Karl D. Kryter (Stanford Research Institute, Sensory Sciences Group, Menlo Park, Calif.).

Science, vol. 151, Mar. 18, 1966, p. 1346-1355. 32 refs.

Discussion of the basic psychological attributes of sound, the behavioral reactions and auditory fatigue from exposure to noise, and community reaction to the noise from jet aircraft. The "loudness" and the "noisiness" of aircraft sound are considered in relation to their significance in estimating people's aversive reaction to sound. The "threshold of annoyance" is found to vary with certain factors such as the person's function and the presence of other noises. The problem of community reaction to aircraft noise is reviewed; it is found that a reasonable upper bound for allowable noise levels cannot be set without considering the number of occurrences of the noise and the duration of each occurrence. The perceived noise levels for sounds generated by aircraft are compared with those for other community noises. The criteria of unacceptability of community noise environment are reviewed, and a possible future aircraft noise problem, the sonic boom, is considered. M.F.

A66-24393

EVOKED POTENTIALS CORRELATED WITH A VISUAL ANOMALY. D. M. MacKay (Keele, University, Dept. of Communication, Keele, Staffs., England) and Adriana Fiorentini (Institute of Optics, Florence, Italy). *Nature*, vol. 209, Feb. 19, 1966, p. 787-789. 9 refs. Research supported by the Department of Scientific and Industrial Research and USAF.

Investigation of the occipital evoked potentials associated with a curious visual anomaly discovered some years ago when an incoherent succession of randomly patterned optical images ("dynamic visual noise") was used as a stimulus. If each frame of such a visual noise sequence is followed by a short bright flash of light in the same eye, which illuminates the same area of the visual field, then within a critical time interval between frame and flash, and at frame repetition rates of the order of 5 to 20 per sec, the random "Brownian movement" normally perceived in the visual noise field is disrupted. The critical lag between the onset of each noise frame and the blank flash varies with frame duration, repetition frequency and intensity, but is typically of the order of 18 to 25 per msec.

M. L.

A66-24396

INDUCTION OF CHROMOSOME INJURIES IN MOUSE BONE MARROW UNDER THE DISTANT EFFECT OF IONIZING RADIATION.

N. F. Barakina and M. I. Yanushevskaya (Academy of Sciences, Institute of Animal Morphology, Moscow, USSR). *Nature*, vol. 209, Feb. 19, 1966, p. 823, 824. 16 refs.

Examination of the data on the distant effect of ionizing radiation on the chromosomes in bone marrow cells. Results are based on experiments carried out on male and female mice of the C57BL strain weighing 18 to 20 g, exposed under the following radiation conditions: X-ray machine of RUP-1 type; 210 kv peak, 15 ma, filtration 0.75 mm Al + 0.5 mm Cu, dose rate 50 roentgens/min. In some animals only one hind limb is exposed, with the rest of the body shielded, and in other animals only surgically exteriorized intestine is irradiated, the body being shielded. When only one hind limb is exposed to radiation, a distinct increase in the number of cells with chromosome injuries is found in shielded regions of the bone marrow. Chromosome damage is not a result of direct irradiation. It is concluded that chromosome injuries appear not only in directly irradiated but also in shielded regions (mostly bridges) of the haemopoietic system and that they are induced by humoral influences (observed not earlier than 2 hr after exposure) from irradiated tissues.

M. L.

A66-24397

AGE, CARDIAC OUTPUT AND CHOICE REACTION TIME.

Jacek Szafran (Lovelace Foundation for Medical Education and Research, Dept. of Experimental Psychology, Albuquerque, N. Mex.). *Nature*, vol. 209, Feb. 19, 1966, p. 836. 8 refs. National Institutes of Health Grant No. HD-0518.

Experimental study utilizing a larger sample than previously in a new attempt to resolve the discrepancy in data on choice reaction time in relation to age in terms of the effective duration of signals of a psychophysiological study of the possible effects of aging on airline, military, and test pilots. The tabulated data makes it clear that, as before, the principal age differences in the sample of over 200 active pilots are to be found in the intercept constant of the formula for choice reaction ($RT = a + b \log_2 n$) under conditions of information overload, not in the slope constant. The investigation is seen to suggest, especially with reference to the data on choice reaction times, that earlier investigations must have included - no doubt inadvertently - subclinical cases of cardiovascular disorder. The results confirm the general impression that age differences in physiological and psychological tests are more revealing when observed under conditions of stress than under baseline or resting conditions: the population samples in those studies of aging in which the occupational and health status of the subjects is not clearly defined may have to be regarded in some sense as nonnormal.

M. L.

A66-24719 #

A PERSONALIZED MATHEMATICAL MODEL OF THE HUMAN BODY.

Ernest P. Hanavan, Jr. (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Human Engineering Div., Crew Stations Branch, Wright-Patterson AFB, Ohio). (American Institute of Aeronautics and Astronautics, Annual Meeting, 2nd, San Francisco, Calif., July 27-29, 1965, Paper 65-498.) *Journal of Spacecraft and Rockets*, vol. 3, Mar. 1966, p. 446-448. 6 refs. [For abstract see issue 19, page 2756, Accession no. A65-30202]

A66-24957

ALERTNESS MANAGEMENT IN INDUSTRY.

J. A. Moody and B. C. Duggar (Bio-Dynamics, Inc., Cambridge, Mass.). (American Industrial Hygiene Association, Annual Meeting, 26th, Houston, Tex., May 3-7, 1965, Paper.) *American Industrial Hygiene Association, Journal*, vol. 27, Jan.-Feb. 1966, p. 17-24. 35 refs. Contract No. NASw-904.

Study of alertness management which is critical to production rate, quality control and operator safety. Alertness management includes (1) elimination of factors conducive to alertness decrement, (2) addition of conditions or procedures which enhance alertness, (3) reduction of the consequences of alertness decrements, and (4) personnel monitoring when necessary. The criteria for evaluating the controlling elements in the task, physical environment, social environment, and procedures which may lead to decrements in alertness are discussed. Monitoring procedures are described and recommendations suggested which should lead to improved alertness management in the industrial situation. An alertness checklist is presented for use in analyzing particular job situations.

M. F.

A66-24958

EVALUATION OF PROTECTIVE CLOTHING AND EQUIPMENT FOR OPERATIONS IN OXYGEN-RICH OR -DEFICIENT ATMOSPHERES APPROACHING -100°F.

Eugene E. Plumb, Edgar L. Mendenhall, and M. Chain Robbins (Boeing Co., Aerospace Group, Seattle, Wash.). *American Industrial Hygiene Association, Journal*, vol. 27, Jan.-Feb. 1966, p. 29-38.

The paper summarizes an investigation conducted to evaluate protective clothing and equipment for personnel who might be required to work up to 90 minutes in the Saturn S-IC booster interstage prior to launch at temperatures approaching -100°F. Because the environment might be either oxygen-rich or -deficient, the selected material must be compatible with liquid oxygen. Tests of clothing and equipment have been conducted in environments to -100°F temperature. Subjects wore various types of arctic clothing and respiratory equipment. In the cold environment they performed tasks simulating those which would be required in the booster interstage. The exposure times were varied from 15 to 57 minutes. The limiting parameters appear to be communications, visibility, and satisfactory respiratory protection at this temperature.

(Author)

A66-24959

VISUAL SEGMENT VS GLIDE SLOPE GEOMETRY.

R. A. Stone (United Air Lines, Inc., Elk Grove Township, Ill.). *Air Line Pilot*, vol. 35, Mar. 1966, p. 4, 5, 23.

Demonstration of how "visual segment," defined as that portion of the approach lights or runway lights which are visible to the pilot at any instant during approach, touchdown, or rollout can vary on approach at different airports as a direct result of the glide slope installation at the particular airport. It is shown that for each foot of descent the visual segment increases 8.2 feet. In the case of Category II airports, the glide slope must have (1) the transmitter located between 750 and 1250 ft "down" the runway from the runway threshold, (2) a descent angle between 2° and 3°, and (3) an elevation as it crosses the runway threshold between 47 and 60 ft. It is shown that, depending on the particular glide slope installed by the FAA, a pilot may have a time interval of between 1.4 to 4.5 sec to make the transition from instrument to visual flight.

F. R. L.

A66-24965**POSSIBLE ABIOTIC ORIGIN OF SOME NATURALLY OCCURRING HYDROCARBONS.**

Cyril Ponnamperna and Katherine Pering (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.).

Nature, vol. 209, Mar. 5, 1966, p. 979-982. 25 refs.

Experimental study comparing hydrocarbons synthesized abiotically with those found in terrestrial samples, by means of gas chromatography and mass spectrometry. During the investigation, attention was directed to the existence of hydrocarbons of possible abiogenic origin in the Mountsorrel formation near Leicestershire, England, where bitumen occurs in mineral veins. Hydrocarbons from the Mountsorrel formation (thought to be possibly abiogenic) were compared with hydrocarbons synthesized by the action of a spark discharge through methane, and with the hydrocarbons from the Posidonian shale, which contain fossils of marine organisms and are generally accepted to be biological in origin. The Posidonian shale (supplied by the U.S. Geological Survey) was collected from the Bohrung Lingen 330 at a depth of 1151.0 to 1159.5 m. The materials were extracted with distilled hexane. The striking feature of the gas chromatograms is the contrast between the Posidonian and those of the Mountsorrel or spark discharge samples. Gas chromatographic data are compared with mass spectrometric data. It is concluded that the hydrocarbons in the Mountsorrel formation were produced by a process very different from that which produced the hydrocarbons in Posidonian and are possibly abiogenic in origin. M. L.

A66-25009**PHYSIOLOGICAL STRESS AND FATIGUE IN AERIAL MISSIONS FOR THE CONTROL OF FOREST FIRES.**

Bruno Balke (Wisconsin, University, Dept. of Physiology and Dept. of Physical Education, Madison, Wis.), Carlton E. Melton, Jr. (Federal Aviation Agency, Aeromedical Service, Civil Aeromedical Research Institute, Physiology Laboratory, Oklahoma City, Okla.), and Clifford Blake (U.S. Forest Service, Equipment Development and Testing Center, Missoula, Mont.).

Aerospace Medicine, vol. 37, Mar. 1966, p. 221-227. 11 refs.

Measurement of physiological response during simulated aerial fire control missions and detection of measurable symptoms of postflight fatigue. In-flight heart rates and respiratory frequencies of Forest Service pilots were obtained via radiotelemetry in single 5-hr flights and on three consecutive days of 8-hr flights. Pre- and postflight exercise tests were performed (1) for the establishment of the individual heart rate: metabolic rate relationship, and (2) for the detection of any "physical fatigue" effects. Also, for the latter purpose, a simple orthostatic tolerance test was employed. According to the results, the physiological demands in the simulated 5-hr "bird dog" missions were not excessive. The in-flight metabolic rate of approximately twice the resting rate was not enough to cause measurable physical fatigue. Conclusions drawn from this study indicate that the physiological demands of forest fire control missions engage nearly 33% of the pilot's maximum capacity. Actual flying time under such condition should not exceed 5-6 hr daily on a 5-day per week schedule. M. F.

A66-25010**A VIRTUALLY CONTINUOUS MEASUREMENT OF HUMAN SYSTOLIC AND DIASTOLIC BLOOD PRESSURE TRANSIENTS WITHOUT DIRECT ARTERIAL PUNCTURE.**

Michael T. Lategola, Hiley Harrison, and Charles Barnard (Federal Aviation Agency, Aeromedical Service, Civil Aeromedical Research Institute, Biodynamics Branch, Oklahoma City, Okla.).

Aerospace Medicine, vol. 37, Mar. 1966, p. 228-233. 6 refs.

A system for virtually continuous measurement of both systolic and diastolic blood pressures without recourse to direct arterial puncture has been effected by the modification of already existing, standard equipment. This system entails the measurement of systolic blood pressure via a digital pressure cuff on one arm simultaneously with the measurement of diastolic blood pressure from a brachial cuff mounted on the other arm. The systolic pressure device was used virtually unmodified. The diastolic pressure device was originally designed to measure both systolic and diastolic pressures automatically. The modification consisted mainly in the elimination of the systolic portion of the automatic cycle. The combined system is capable of routinely obtaining measurement

frequencies in the order of twenty per minute for protracted time periods. The system functions well under all resting-subject conditions and under some "body-movement" conditions. (Author)

A66-25011 #**CHEMICAL ANALYSIS OF PERMANENT AND ORGANIC GASES IN A 30-DAY MANNED EXPERIMENT.**

William H. Toliver, Sr. (USAF, Systems Command, Aerospace Medical Div., Medical Research Laboratories, Wright-Patterson AFB, Ohio) and Melvin L. Morris (North Dakota State University, College of Chemistry and Physics, Fargo, N. Dak.).

Aerospace Medicine, vol. 37, Mar. 1966, p. 233-238. 8 refs.

Chemical analyses of the permanent gases and the trace volatile organic constituents were performed on a 30-day manned experiment. This experiment was primarily concerned with the feasibility of providing a suitable atmosphere for three men. The primary instrumentation used was the gas chromatograph. The adjunct instrumentation was infrared spectrophotometry and mass spectrometry. Consideration is given to the sampling and analytical procedures used. Organic compounds unique to space cabin and evaluator studies are reported. Indications of future gas chromatography methodology are given. (Author)

A66-25012**LIMITATIONS AND RELIABILITY OF THE HUMAN OPERATOR OF CONTROL SYSTEMS TO PROCESS INFORMATION.**

Jacek Szafran (Lovelace Foundation for Medical Education and Research, Dept. of Experimental Psychology, Albuquerque, N. Mex.).

(*Aerospace Medical Association, Annual Meeting, 36th, New York, N.Y., Apr. 26-29, 1965, Paper.*)

Aerospace Medicine, vol. 37, Mar. 1966, p. 239-242. 35 refs.

U.S. Public Health Service Grant No. HD-0518.

The theory of human skill is briefly reviewed. It is argued that, within certain well-defined limits, the extent to which man can extract information from sensory inputs is impressive, even if for some purposes intensive training has to precede efficient performance. It is concluded that one of the key notions in the appraisal of operational reliability of man in space should be endurance - in the sense of a capacity to adapt rapidly to changing requirements and strange conditions (including those of reduced "signal-to-noise" ratio), as well as a general willingness to plan the effort so as to maximize the likelihood of sustained performance. (Author)

A66-25013**EFFECTS OF CONTINUOUS EXPOSURE OF RATS TO 100 PER CENT OXYGEN AT 450 MM. HG FOR 64 DAYS.**

Gerald A. Brooksby, Robert W. Staley (NASA, Ames Research Center, Biotechnology Div., Moffett Field, Calif.), and Robert L. Dennis (San Jose Hospital, San Jose, Calif.).

Aerospace Medicine, vol. 37, Mar. 1966, p. 243-246. 30 refs.

Young Sprague-Dawley rats were exposed, under constant uninterrupted conditions, to pure oxygen (99.8 ± 0.2%) at a total pressure of 450 mm Hg for 64 days and compared with controls. Growth rates and food and water consumption were measured during the exposure period. All animals survived and appeared normal with no signs of distress during the experiment. At the conclusion of the 64-day exposure period, all animals were sacrificed and histological and hematological studies were performed. There were no significant differences in food and water consumption or demonstrable histological and hematological differences. It appears that the experimental conditions used were below the threshold level necessary to produce distress or pathology in this strain of rat. (Author)

A66-25014**HEMODYNAMIC RESPONSE TO G-SUIT INFLATION WITH AND WITHOUT GANGLIONIC BLOCKADE.**

Robert H. Eich, Harold Smulyan, and William R. Chaffee (New York, State University, Upstate Medical Center; Veterans Administration Hospital, Syracuse, N.Y.).

Aerospace Medicine, vol. 37, Mar. 1966, p. 247-250. 19 refs.

The acute hemodynamic effects of G-suit inflation were studied in 21 normal supine subjects. Although suit inflation consistently

elevates central venous pressure and augments venous return, cardiac output falls slightly. This is presumably due to various depressor reflexes, which originate in part at least on the arterial side. However, partial removal of reflex regulation by ganglionic blockade did not result in an increase in cardiac output following G-suit inflation. Reasons for this are either that the blockade was not complete or that the increase in arterial pressure brought about by suit inflation still prevented the output rise. (Author)

dose of 10 mg was used. Meclizine (Bonamine 150 mg), thiethylperazine (Torecan 30 mg), trimethobenzamide (Tigan 750 mg), and prochlorperazine (Compazine 15 mg) all were less effective than in a previous study when one-third of these doses was used. The combination of hyoscine and d-amphetamine was the most effective drug, followed by hyoscine, d-amphetamine, and meclizine, in that order. M.F.

A66-25015

RESPONSE OF TISSUE CULTURE CELLS TO LOW MAGNETIC FIELDS.

Arthur E. Greene and Myron H. Halpern (South Jersey Medical Research Foundation, Camden, N.J.; Franklin Institute, Research Laboratories, Philadelphia, Pa.).

Aerospace Medicine, vol. 37, Mar. 1966, p. 251-253. 9 refs. National Institutes of Health Grants No. CA-04953-06; No. GM-10563-01.

Tissue cultures of HeLa, WI-38, KB, Chinese hamster, and chick embryo were exposed to magnetic fields of 0.0005 oersted, ambient (0.5 oersted), 350, 400, 500, 550, and 600 oersted for four days. In addition, HeLa cells were exposed repeatedly to 1200 oersted for the same period. Four consecutive serial passages of HeLa cells were grown in the experimental fields. On the fourth day of fourth passage, cells were counted. Cell counts of the experimental culture after exposure to the magnetic fields did not show any significant quantitative growth differences compared to controls. Based on these data, low magnetic fields appear to have no effect upon cells in tissue culture. (Author)

A66-25016

CARDIOVASCULAR EFFECTS OF ROTATION IN THE Z AXIS.

Charles W. Urschel (Georgetown University Hospital, Div. of Cardiology, Washington, D.C.) and William B. Hood, Jr. (USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Biophysics Laboratory, Multi-Environment Div., Environment Stress Branch, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 37, Mar. 1966, p. 254-256. 10 refs.

Rotation of the seated subject about the Z axis (R_z) results in a radial acceleration gradient impeding venous return thereby representing a cardiovascular stress. The cardiovascular responses of volunteer subjects instrumented with indwelling arterial and venous catheters were measured during four rotational profiles combining two rates of angular acceleration (0.1 and 0.8 radians per second per second) and two rotational speeds (60 and 120 rpm). There was a three-minute plateau at peak velocity. Centripetal acceleration at hand/foot radius (0.5 meters) was 1.8 and 7.4 G at 60 and 120 rpm, respectively. Rotation at 60 rpm represented no significant stress. Three minute 120 rpm runs however caused progressive tachycardia, narrowing of pulse pressure, and a drop in mean arterial pressure, thus inferentially a drop in cardiac output. Tolerance would thus be expected to be limited by the ability of the circulation to maintain venous return. (Author)

A66-25017

COMPARISON OF EFFECTIVENESS OF SOME ANTIMOTION SICKNESS DRUGS USING RECOMMENDED AND LARGER THAN RECOMMENDED DOSES AS TESTED IN THE SLOW ROTATION ROOM.

Charles D. Wood (Arkansas, University, School of Medicine, Dept. of Pharmacology, Little Rock, Ark.), Ashton Graybiel, and Robert S. Kennedy (U.S. Naval School of Aviation Medicine, Pensacola, Fla.).

Aerospace Medicine, vol. 37, Mar. 1966, p. 259-262. 13 refs. NASA-sponsored research.

Use of increased doses of antimotion sickness drugs to investigate any possible increase in efficiency. Twice the dose of hyoscine (1.2 mg) failed to increase its effectiveness; however, when it was used in combination with d-amphetamine the total number of tolerated head movements exceeded the sum of that with these drugs when they were tested alone. A marked increase in effectiveness of d-amphetamine (20 mg) was noted over that in the earlier study in which a

LC ENTRIES

A66-80978

COLD TOLERANCE OF THE HIBERNATOR [DIE KALTETOLERANZ DES WINTERSCHLAFERS].

W. Brendel, H.-J. Reulen, P. Aigner, and K. Messmer (U.-Klin., Exptl. Abt. der Chir., Munich, West Germany).

Naturwissenschaften, vol. 52, Sep. 1, 1965, p. 501. 5 refs. In German.

Survival for homoiothermic animals at temperatures below 10° C. is shortened by edema of the brain due to the inhibition of the active cation transport (sodium retention). Symptoms and pathology of this cold edema of the brain are the same as those due to toxins, hypoxia, or trauma. Two groups of dormice (*Glis glis*) were cooled to 0–1° C.: group I in summer under ether anesthesia and artificial respiration, and group II while hibernating with rectal temperatures of 6–16° C. Group I showed a pronounced cold edema of the brain with increase of sodium and water content. However, in the hibernating group there was no significant change in Na and H₂O content during hypothermia. It is concluded that the lack of cold edema with Na and H₂O retention is responsible for the longer survival times of hibernating animals at body temperatures below 10° C. In summer the survival rates of hibernators under hypothermia are similar to those of nonhibernators.

A66-80979

PHYSIOLOGY OF THE AIR PASSAGES.

Donald F. Proctor (Johns Hopkins U., Baltimore, Md.)

IN: RESPIRATORY THERAPY.

Edited by Peter Safar.

Clinical Anesthesia, no. 1, 1965, p. 13–27. 12 refs.

The normal morphology and physiology of the human air passages and their lining mucosa are reviewed. Factors influencing air passageway caliber and air flow dynamics are enumerated. In addition to respiration, other reflex functions of the respiratory tract, such as swallowing, gagging, phonation, coughing, yawning, sneezing, and sighing are examined. Maintenance of a healthy mucous membrane is of great importance for continuous normal bodily function and defense.

A66-80980

PROLONGED ARTIFICIAL VENTILATION.

Peter Safar and Herbert G. Kunkel (Pittsburgh, U., School of Med., Pa.)

IN: RESPIRATORY THERAPY.

Edited by Peter Safar.

Clinical Anesthesia, no. 1, 1965, p. 93–137. 71 refs.

Contract DA-49-193-MD-2160.

Prolonged artificial ventilation can be beneficial in the management of paralyzed respiratory muscles, severe lung pathology, chest wall trauma, restricted diaphragmatic movement, and metabolic acidosis. The forces which oppose artificial and spontaneous lung inflation are discussed: (1) elastic resistance of lungs and thorax, (2) airway resistance, (3) tissue viscous resistance, and (4) inertia to accelerative forces. Techniques and instruments are illustrated and discussed.

A66-80981

INHALATION OF OXYGEN.

Sidney W. Winchell (Pittsburgh U., Pa.)

IN: RESPIRATORY THERAPY.

Edited by Peter Safar.

Clinical Anesthesia, no. 1, 1965, p. 139–168. 50 refs.

Physiologic effects are seen when inhaled partial pressure of oxygen remains below approximately 450 mm. Hg (60% at 1 ATA (atmosphere absolute)), but harmful effects of oxygen become manifest at partial pressures greater than this. The effects of oxygen on respiration, lungs, central nervous system, and cellular metabolism are briefly discussed. Clinical indications for oxygen inhalation include hypoxia, reduced alveolar ventilation, physiological shunts, anemia, and inadequate cardiac output. Oxygen administration equipment, including face masks and cones, tents, and hoods for adults, children, and infants are illustrated.

A66-80982

AEROSPACE CONSIDERATIONS IN HEALTH AND DISEASE.

Carl E. Wilbur (Navy Dept., Bur. of Med. and Surg., Washington, D. C.)

Archives of Environmental Health, vol. 11, Dec. 1965, p. 818–823.

New concepts of health and disease are required in the development of man-machine systems such as high performance air and spacecraft. In addition to an unusually precise delineation of human inputs as a part of the machine's performance profile, much of current aerospace research is directed toward man's adaptation to new environments aloft. The problems of hypoxia, dysbarism, orientation, weightlessness, sound intensity, and radiation are briefly discussed.

A66-80983

A MANNED INTERPLANETARY FLIGHT CONCEPT.

Benjamin P. Martin and John Zoszak (Lockheed Missiles and Space Co., Res. and Develop. Div., Sunnyvale, Calif.)

*(N.Y. Acad. of Sci., Conf. on Civilian and Mil. Uses of Aerospace, Jan. 11–14, 1965).**Annals of the New York Academy of Sciences*, vol. 134, Nov. 22, 1965, p. 126–148. 6 refs.

Venus and Mars flyby missions are analyzed in relation to heliocentric flight paths and earth launch requirements of subsystems and spacecraft design. It appears that these missions are entirely within capability of achievement with no technological improvements of a revolutionary nature. More information is desirable on solar radiation, not only absolute intensity and prediction techniques, but intensity variation as a function of solar distance; and also on meteoroid flux in the vicinity of Mars' orbit and beyond. Unmanned probes could play a useful role. Some items in life support and environmental control are still presenting difficulty, e.g., oxygen recovery from carbon dioxide; but this recovery represents only a small mass saving so the function could be eliminated (slightly closer to an open system) with very little mass penalty. Power systems, although technically feasible, require development effort because of reliability requirements. Reasons indicating why it is felt that flyby missions should be considered are listed and discussed.

A66-80984

AEROSPACE STATION SIMULATION FOR THE MAN, THE SYSTEM AND THE VEHICLE.

Clifford P. Setz and Norman Freeberg (Grumman Aircraft Eng. Corp., Human Factors Group, Bethpage, N. Y.)

*(N.Y. Acad. of Sci., Conf. on Civilian and Mil. Uses of Aerospace, Jan. 11–14, 1965).**Annals of the New York Academy of Sciences*, vol. 134, Nov. 22, 1965, p. 355–365.

The three phases of the Grumman Simulator Studies for the Apollo-LEM (Lunar Excursion Module) mission are reported as: (1) preliminary simulation of certain elements; (2) total simulation in two separate simulators; and (3) Full Mission Engineering Simulation (FMES) in a single simulator. Three samples of Phase 1 studies are discussed. Consideration is given to crew performance, vehicle design, and engineering problems which may be encountered during docking and lunar landing. The possibility of errors in visual observations of the lunar surface is discussed, and the problems and limitations of the simulation configuration are considered.

A66-80985

DESIGN OF THE BIOSATELLITE SPACECRAFT.

Vincent C. DeLiberto (Gen. Elec. Co., Re-entry Systems Dept., Missiles and Space Div., Philadelphia, Pa.)

*(N.Y. Acad. of Sci., Conf. on Civilian and Mil. Uses of Aerospace, Jan. 11–14, 1965).**Annals of the New York Academy of Sciences*, vol. 134, Nov. 22, 1965, p. 385–397.

The Biosatellite is an orbiting, recoverable spacecraft designed to perform a series of biological experiments for the National Aeronautics and Space Administration. Investigations included for study by this spacecraft are as follows: (1) the combined effects of weightlessness and radiation on animals, plants, and cells for durations up to 3 days; (2) the effects of weightlessness and the unique environment of an earth-orbiting satellite on biological rhythms and general biology, including cellular processes of plants and animals for periods up to 21 days; and (3) the effects of prolonged weightlessness on behavior, cardiovascular system, and central nervous system of primates for orbital duration periods of up to 30 days. Although primary emphasis is placed on the spacecraft and its subsystems for accomplishing the currently defined Biosatellite missions, the design embodies concepts and techniques that provide flexibility to accomplish other bioscience, physical science, and engineering experiments of the future.

A66-80986

SOME CONSIDERATIONS CONCERNING THE DETECTION OF EXTRA-TERRESTRIAL LIFE.

T. Sall (Pa. U. Hosp., Pepper Lab., Philadelphia)

*(N.Y. Acad. of Sci., Conf. on Civilian and Mil. Uses of Aerospace, Jan. 11–14, 1965).**Annals of the New York Academy of Sciences*, vol. 134, Nov. 22, 1965, p. 452–453.

An exploratory approach to yield the highest probability of success in the search for life during surveillance of the Martian environment is presented. It is suggested that as much information as possible be obtained concerning the environs (both atmospheric and surface) of Mars as related to time (seasonal changes) prior to sampling the surface of the planet. The purpose of such an exercise will be to assure the investigators that the craft which will eventually be deployed to sample the surface of Mars will land at the location and at the time most suited for the support of life. A mission of this sort can

be accomplished by a Mars Orbiting Spacecraft equipped with a wide band, as well as ultraviolet and ionizing radiation sensitive video. Such a Mars surveillance satellite will map the planet, at a distance compatible with high resolution sensing, for at least one Martian year so that the seasonal changes can be adequately observed. If a spacecraft by some slim chance is non-sterile, the planet will be contaminated and all future biological investigations will be rendered valueless. For this reason, consideration should be given to the possibility of landing a single spacecraft, completely equipped with physical, chemical, and biological integrated life detecting devices, instead of several small crafts with one or two individual devices.

A66-80987

NEW FINDINGS REGARDING THE INFLUENCE OF TEMPERATURE, HUMIDITY, AND BAROMETRIC PRESSURE AS WELL AS SERUM IODINE RATIO ON THE OXYGEN METABOLISM IN THE ALBINO RAT [NEUE BEFUNDE ÜBER DIE ABHÄNGIGKEIT DES O_2 -STOFFWECHSELS BEI WEISSEN RATTEN VON TEMPERATUR, LUFTFEUCHTE UND LUFTDRUCK SOWIE VOM SERUMJOD-QUOTIENTEN].

Joachim-Hermann Scharf, Dieter Marzotko, Rainer Schmidt, Friedrich Groh, and Theodor Weichmann (Martin-Luther-U. Halle-Wittenberg, Inst. für Exptl. Med. and Anat. Inst., Halle (Saale), East Germany). *Endokrinologie*, vol. 48, Sep. 1965, p. 201-220. 17 refs. In German.

Microclimate within the laboratory and particularly in the animal quarters was carefully monitored with respect to temperature, humidity, and barometric pressure. Temperature was shifted deliberately over a range of 20-30° C. Oxygen consumption was measured in 168 rats after treatment with the following, either singly or in combination: methylthiouracil (MTU), p-hydroxypropionophenone (POP), diiodotyrosine, and alloxan. Normal untreated animals increased their metabolism to a significant extent in the rising ambient temperature (20° to 30° C.). Apparently maintenance of homeothermia in rising temperature necessitates a rise in the energy which is obtained through a slight increase in metabolism. POP or diiodotyrosine medication preserved this effect or augmented it. POP and MTU combination brought about an inversion, i.e., a fall in oxygen consumption with rising ambient temperature. Normal rats and those treated with diiodotyrosine showed no metabolic response to humidity. Such could be evoked only by artificial inhibition of endocrine glands. Changes in barometric pressure were without effect in normal or treated animals.

A66-80988

THE SHORT-DURATION COMPONENT OF GAS METABOLISM REGULATION AS A FUNCTION OF SHORT-DURATION OSCILLATIONS OF THE ENVIRONMENTAL TEMPERATURE [DIE KURZZEITIGE KOMPONENTE DER GASSTOFFWECHSELREGELUNG ALS FUNKTION DER KURZZEITIGEN OSCILLATIONEN DER UMGEBUNGSTEMPERATUR].

Joachim-Hermann Scharf, Dieter Marzotko, Rainer Schmidt, and Rainer Hammer (Martin-Luther-U. Halle-Wittenberg, Anat. Inst., Halle (Saale), East Germany). *Endokrinologie*, vol. 48, Nov. 1965, p. 303-314. 27 refs. In German. DDR, Staatssekretariat für Hochschulwesen supported research.

Oxygen consumption was measured daily in 168 male rats over a long period of time in a controlled thermal environment with deliberate variations in temperature. Different groups of rats were treated with one or a combination of the following: sodium chloride, methylthiouracil (MTU), p-hydroxypropionophenone (POP), diiodotyrosine, and alloxan. Combined regression and Fourier analysis separated the two components of the effect of ambient temperature on gas metabolism. The first is a long-term component which is in inverse linear relationship to the environment of the organism and constitutes the functional basis of seasonal adaptation. The second is a short-term component in normal animals which results in metabolic changes paralleling the shifts in temperature in a stochastic proportional manner. Treatments with MTU, diiodotyrosine and MTU, and alloxan and MTU inhibit these metabolic changes. POP and MTU treatment results in a phase shift of oxygen metabolism, i.e., short-term rises of ambient temperature are responded to by lowered metabolism.

A66-80989

ON CHANGES OF CEREBRAL METABOLISM AFTER ACUTE CARBON MONOXIDE POISONING AND ON THE EFFECTS OF SODIUM SUCCINATE ON CARBON MONOXIDE POISONING [ÜBER VERÄNDERUNGEN DES HIRNSTOFFWECHSELS NACH AKUTER KOHLENMONOXYDVERGIFTUNG UND ÜBER DEN EINFLUSS VON NATRIUMSUCCINAT AUF DIE KOHLENMONOXYDVERGIFTUNG].

C.-J. Estler (Erlangen-Nürnberg U., Pharmakol. Inst., West Germany). *Archives Internationales de Pharmacodynamie et de Thérapie*, vol. 158, Dec. 1965, p. 415-428, 69 refs. In German.

Mice exposed to 1% carbon monoxide for three min. showed signs of severe poisoning (dyspnea, loss of righting reflexes and convulsions). Carboxyhemoglobin rose up to 83%. As a result of the impaired oxygen transport the glycolysis in the brain was stimulated, as indicated by a decrease in the glycogen and glucose content and an increase in the lactate and pyruvate

content. Fall in phosphocreatine content pointed to insufficient production of energy. Blood pH indicated acidosis. After the exposure carboxyhemoglobin content fell within 30 min. to 6%. Blood pH and metabolic shifts in the brain normalized at the same time, but later than the outward signs of poisoning, which had disappeared within 5 min. In the restitution phase there was an increase in the blood sugar level which lasted for two hours and also raised the brain glucose content. Sodium succinate 1 mg./g. intraperitoneally did not affect metabolic changes in the brain due to carbon monoxide. Hyperglycemia was augmented by succinate. Thirty min. later alkalosis set in which lasted for more than 2 hours. Since alkalosis occurred also after sodium succinate injections without poisoning it was probably caused by an increase in the alkali reserve due to the sodium content of sodium succinate.

A66-80990

ON THE MECHANISM UNDERLYING ANTIRADIATION EFFECT OF MERCAMINE [K VOPROSU O MEKHAZIME PROTIVORADIATIONNOGO EFFEKTA MERKAMINA].

G. T. Chernenko.

Farmakologiya i Toksikologiya, vol. 28, Jul.-Aug. 1965, p. 475-477. In Russian.

Tests carried out on rats demonstrated that bactericidal activity of blood serum in healthy animals declined during the first three hours following injection of mercamine (100 mg./kg. intraperitoneally). An injection of mercamine before 800-r irradiation attenuated the extent of the bactericidal activity of the blood serum in rats.

A66-80991

SULFHYDRYL GROUPS CONTENT IN THE BLOOD SERUM OF RABBITS IN CHRONIC INTOXICATION WITH LOW MERCURY FUMES CONCENTRATIONS [SODERZHANIE SULFIDRIL'NYKH GRUPP V SYVOROTKE KROVI KROLIKOV PRI KHROKICHESKOI INTOKSIKATSII PARAMI RTUTI V MALYKH KONTSENTRATSIIAKH].

M. M. Gimadeev (Ufa Sci. Res. Inst. of Hyg. and Prof. Diseases, Ufa, USSR). *Farmakologiya i Toksikologiya*, vol. 28, Jul.-Aug. 1965, p. 483-484. In Russian.

Tests set up on rabbits demonstrated that in chronic poisoning with mercury vapors in concentrations from 0.01 to 0.015 mg./cu. m. the concentration of sulfhydryl groups in the blood serum decreased. Normalization took place upon recovery.

A66-80992

EVOKED POTENTIALS FROM THE VISUAL SYSTEM IN HYPOTHERMIC HIBERNATORS AND NONHIBERNATORS.

L. C. Massopust, Jr. and L. R. Wolin (Cleveland Psychiat. Inst., Lab. of Neuropsychol., Ohio).

Experimental Neurology, vol. 14, Feb. 1966, p. 134-143. 17 refs. Grant NIH NB-04393-03.

Evoked potentials from the visual system in hibernators and nonhibernators were examined under induced hypothermia. Responses were recorded from the eye (ERG), optic chiasm, superior colliculus, and visual cerebral cortex. The a-wave of the ERG disappeared early during hypothermia in both classes of animals at 24° C. esophageal or buccal temperature. The b-wave component of the ERG was lost at 24° C. in the nonhibernator but persisted to 17° C. in the hibernator. In the nonhibernators the evoked responses recorded from the optic chiasm dropped in amplitude slightly, then leveled off and remained at this level to 25° C. where a precipitous drop to zero amplitude took place at 24° C. In hibernators this drop in amplitude was progressive and more linear. Progressive and linear drops in amplitudes of the evoked responses in the superior colliculus and visual cortex occurred in all animals. The latencies of these responses were most remarkable, increasing about 285% in the nonhibernators but increasing to over 500% in the hibernators. The longest measurable latency was found in the optic chiasm of the prairie dog where the latency increased to about 90 msec. at 17° C., or a 600% increase over the 15-msec. latencies measured at normothermic temperatures. Some protective mechanisms considered playing a role in these results were the resistance of the anterior reticular formation to cold which maintains minimal conditions within the central nervous system for transmission of impulses, the preferential shunting of blood to certain brain-stem areas, and the natural resistance to cold of certain heavily myelinated tracts of the brain stem.

A66-80993

REACTION TIME TO ELECTROCUTANEOUS ONSET AND OFFSET STIMULATION.

Thomas G. Sticht and Emerson Foulke (Louisville, U., Ky.)

Psychonomic Science, vol. 4, Feb. 25, 1966, p. 213-214. 6 refs. NASA Grant NGR 19-002-007.

Reaction times were obtained from two subjects to the onset (beginning) and offset (cessation) of 70 c.p.s. AC electrocutaneous stimuli of three sensation levels: low, medium and high. The results indicated that onset was faster than offset reaction times at all three intensity levels.

A66-80994

EVOKED CORTICAL RESPONSE DURING VIGILANCE.

Robert T. Wilkinson, Henry C. Morlock, and Harold L. Williams (Walter Reed Army Inst. of Res., Washington, D. C.)

Psychonomic Science, vol. 4, Feb. 25, 1966, p. 221-222. 13 refs.

In a conventional vigilance situation a relationship was found between the averaged evoked cortical response to the vigilance stimuli and the subjects' ability to detect occasional, slight changes in these stimuli. The pattern of change in the evoked response that accompanied failures of detection suggested lowered arousal rather than distracted attention as the cause.

A66-80995

SEPARATION THRESHOLDS FOR COLORED BARS WITH AND WITHOUT LUMINANCE CONTRAST.

Harold P. Bishop (Tufts U., Medford, Mass.)

Psychonomic Science, vol. 4, Feb. 25, 1966, p. 223-224. 5 refs.

Grant PHS NB 05088-02.

Separation thresholds for rectangular bar targets were obtained for certain combinations of black, white, and colored targets and grounds. Relatively low threshold separation scores were obtained with colored targets against white grounds with targets and ground equated in luminance. The results suggest that color contrast is sufficient but less efficient than luminance contrast for visual acuity.

A66-80996

EXPERIMENTAL HEMORRHAGE DUE TO STRESS FOLLOWED BY ANTI-COAGULANT IN RATS: LACK OF PROTECTION BY CNS DEPRESSANTS.

O. N. Lucas, G. J. Miller, and L. B. Jaques (Saskatchewan U., Dept. of Physiol. and Pharmacol., Saskatoon, Canada).

Acta Physiologica Latino Americana, vol. 15, no. 3, 1965, p. 285-291.

10 refs.

Grant PHS HE-04877.

Rats were subjected to a stress agent, 10% NaCl by interperitoneal injection, and were then provided with the anticoagulant phenylindanedione (PID) in the food for 10 days. Half the animals died with severe internal hemorrhage and all survivors showed hemorrhage at the end of ten days. Anaesthesia prior to injection of the NaCl did not protect the animals from hemorrhage. Other rats were subjected to a psychic stress procedure, partial physical restraint for 12 hours, and were then given PID in the food for 10 days. All animals showed internal hemorrhage at the end of the experiment. Sedation with Nembutal, Dial, or Librium during the period of restraint did not protect the animals from hemorrhage. Stresses of the type used have a surprisingly prolonged duration of action that is not diminished by anaesthesia or sedation during the application of the stress.

A66-80997

EFFECTS OF A SUBSIDIARY TASK ON SHORT-TERM MEMORY.

Bennet B. Murdock, Jr. (Mo. U., Dept. of Psychol., Columbia).

British Journal of Psychology, vol. 56, 1965, p. 413-419. 11 refs.

Grant PHS MH-10,882.

If there is a limited-capacity mechanism in short-term memory (STM), then introducing a concurrent subsidiary task should adversely affect recall. Two experiments on free recall were conducted with card sorting as the subsidiary task. In the first experiment subjects dealt cards into one pile, into two piles by color, or into four piles by suit while lists of common English words were being read. Subjects sorted cards only during presentation of the lists. As the subsidiary task became more demanding the number of words correctly recalled decreased. In the second experiment sorting by suit was combined with free recall, and the payoffs (relative importance of the two tasks) were varied. Performance on both the recall and the card sorting tasks deteriorated as the other task was stressed. Differences in recall could not easily be attributed to differences in original learning, and the results suggested that the subsidiary task interfered with rehearsal and/or decreased total presentation time for free recall.

A66-80998

SUSPENDED ANIMATION AND THE ORIGIN OF LIFE.

H. E. Hinton and M. S. Blum (Bristol U., Dept. of Zool., Great Britain).

New Scientist, vol. 28, Oct. 28, 1965, p. 270-271.

Terrestrial microorganisms and more organized forms such as the larvae of chironomid flies (*Polypedilum vanderplanki* Hint), which can tolerate almost total suppression of metabolism by dehydration, indicate the possibility of an origin of life on the land surface of the earth. Reactions could originate in electrical discharges or be initiated by ultraviolet light; the resulting compounds could fall on solid surface where they could be exposed to alternate wetting and drying. Minute terrestrial niches could provide protection against radiation damage and permit high concentrations of chemicals and widely varied acid or alkaline conditions to occur, thus favoring diverse chemical reactions when wetted.

A66-80999

SKIN CONDUCTANCE CHANGE AND SENSORY DISCRIMINATION.

R. S. Corteen and A. R. Blackman (Edinburgh U., Psychol. Dept., Great Britain).

British Journal of Psychology, vol. 56, 1965, p. 431-437. 17 refs.

The relation between mean log. change in conductance and sensory discrimination was investigated. Highly significant relations were found with critical flicker frequency (CFF) and two-point tactile thresholds. No significant relation was found with discrimination of a pure tone from background white noise. An attempt at explanation is offered in terms of a cortically controlled center mediating a sensitizing or orienting response of which conductance change is a peripheral manifestation.

A66-81000

FAILURE OF RECOVERY FROM REACTIVE HYPEREMIA IN THE ABSENCE OF OXYGEN.

Hilton M. Fairchild, Joe Ross, and Arthur C. Guyton (Miss. U., Med. Center, Dept. of Physiol. and Biophys., Jackson).

American Journal of Physiology, vol. 210, Mar. 1966, p. 490-492. 16 refs. NIH supported research.

In eight dogs reactive hyperemia was caused in the hindlimb by occluding arterial inflow for 3-10 min. On release of the occlusion, the limbs were perfused with blood that had had all of its oxygen removed. There was no recovery from the reactive hyperemia until the perfusion blood was reoxygenated 10 min. later. Following reoxygenation, complete recovery occurred within another few minutes.

A66-81001

PERCEPTION BIBLIOGRAPHY: XXV. PSYCHOLOGICAL INDEX NO. 21, 1914.

C. H. Ammons and R. B. Ammons (Mont. U., Missoula).

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 79-82. 114 refs.

This is a list of 114 items dealing with perception selected from the *Psychological Index*, no. 21, 1914.

A66-81002

PERCEPTION BIBLIOGRAPHY: XXVI. PSYCHOLOGICAL INDEX NO. 22, 1915.

R. B. Ammons and C. H. Ammons (Mont. U., Missoula).

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 107-110. 111 refs.

In this listing are 111 items dealing with perceptual processes and selected from *Psychological Index*, no. 22, 1915.

A66-81003

INTERMANUAL TRANSFER OF COMPENSATION FOR DISPLACED VISION.

Ronald E. Kalfi and Sanford J. Freedman (Tufts U., Medford, Mass.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 123-126. 10 refs.

Contract AF 49(638)-1282 and Grant Dept. of HEW RD-1688-P.

While wearing displacing prisms, each subject viewed one hand as he reached for and touched a target in the mid-sagittal plane. After exposure, significant compensation was measured with the contralateral hand.

A66-81004

PERSISTENCE OF OCULAR ROTATION FOLLOWING COMPENSATION FOR DISPLACED VISION.

Ronald E. Kalfi and Sanford J. Freedman (Tufts U., Medford, Mass.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 135-139. 10 refs.

Contract AF 49(638)-1282 and Grant Dept. of HEW RD-1688-P.

Photographic measurements of eye position before and after compensation for prismatic visual displacement revealed significant and persistent lateral ocular rotations of which subjects seemed unaware. These rotations could account for errors in reaching when prisms are first worn as well as for aftereffect errors.

A66-81005

PASSIVELY GENERATED ADAPTATION TO PRISMATIC DISTORTION.

William B. Templeton, Ian P. Howard, and Ann E. Lowman (Durham U., Great Britain).

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 140-142.

Observers were provided with both a motive and an opportunity to resolve the conflict arising from displaced vision under conditions which precluded reafferent information. Passive pointing to displaced visual targets with knowledge of results was shown to produce significant adaptation of subsequent active pointing.

A66-81006

PSYCHOPHYSICAL METHOD AND PHORIA AS VARIABLES DETERMINING APPARENT MOTION PERCEPTION.

Alan W. Rusnak (Larue D. Carter Mem. Hosp., Indianapolis, Ind.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 147-152. 8 refs.

Psychophysical method, degree of heterophoria, and type of heterophoria (esophoria and hyperphoria) were studied as variables affecting the perception of beta motion in 25 male subjects and 25 female subjects. Esophoria was more disruptive of motion perception than hyperphoria, for all subjects, with the stimuli presented in a horizontal plane. The method of constant stimuli produced greater mean durations of perceived motion in the male subjects than the method of serial exploration but was non-significant for females. Degree of heterophoria did not significantly affect mean durations of perceived motion for either group, leading to the conclusion that beta motion is a highly stable phenomenon.

A66-81007

KINETIC FRAME EFFECTS: III. GYROSCOPIC MOTION.

K. Sayons (St. Louis U., Mo.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 153-154.

When a frame, in the kinetic frame situation, was rotated at 5 c.p.s., the frame was experienced by each of 40 subjects as spinning three-dimensionally around the line, primarily at either the objective rate (in 10 subjects) or half the objective rate (in 23 subjects). Phase overlay, presumed to underlie the three-dimensional spin, was also observed.

A66-81008

BLINK RATE AS A FUNCTION OF INDUCED MUSCULAR TENSION AND MANIFEST ANXIETY.

C. Stanley Harris, Richard I. Thackray, and Richard W. Shoenberger (Behavioral Sci. Lab., Wright-Patterson AFB, Ohio).

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 155-160. 7 refs. USAF Systems Command supported research.

The blink rate of 25 subjects was compared under the conditions of 4 min. rest and 4 min. of muscle tension. It was found that blinks distinguished between the two conditions but not between successive minutes of muscle tension. The number of blinks during both periods correlated significantly with paper-and-pencil measures of anxiety (Taylor Manifest Anxiety Scale, Maudsley Personality Inventory). The results are interpreted as supporting Meyer's (1953) theory of the interaction of simultaneous responses.

A66-81009

ESTIMATION OF TEMPORAL INTERVAL.

Ram G. Chatterjee (Brown U., Providence, R. I.) and Purabi Rakshit (Calcutta U., India).

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 176.

Twenty subjects made estimates of temporal intervals with either auditory or visual stimuli marking the time. Red, green, yellow, blue, and white lights were used in visual presentation. Color preferences of the subjects had been determined previously by the paired-comparison method. The results of time estimates conform to data reported earlier. Colored light did not exert a significant influence on individual estimates.

A66-81010

INFLUENCE OF MOTIVATION ON REACTIVE INHIBITION IN EXTRAVERSION-INTROVERSION.

Martin J. Hogan (Detroit U., Mich.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 187-192. 16 refs.

The present study was designed to examine the influence of reactive inhibition (defined as involuntary rest pauses) on the performance of a vigilance task by extraverts and introverts. It was hypothesized that extraverts would perform more poorly than introverts when level of motivation was held constant. A personality inventory, a motivation questionnaire and a psychomotor (vigilance) task were administered to 50 female subjects, who were grouped as extraverts or introverts on the basis of their personality test scores. Level of motivation for the two groups was equated. Mean performance scores on the vigilance task for the two groups were compared. The results suggest that the concept of reactive inhibition as applied by Eysenck may be used to explain the vigilance performance of extraverts and introverts. There was some support for Eysenck's finding that high levels of drive tend to obscure the performance difference between introverts and extraverts.

A66-81011

INDIVIDUAL DIFFERENCES IN PERFORMANCE OF A DISCRIMINATION TASK.

Eljah Lovejoy (Pa. U., Philadelphia), Myron B. Manley (Mass. U., Amherst), and Myron Goldstein (Princeton U., N. J.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 195-199. 8 refs.

Grants AFOSR AF-AFOSR-62-197 and AF-AFOSR-965-65.

Fifth-grade children performed a four-display discrimination task in which reinforcement depended on the positions of two stimulus alternatives and

the identities of extra stimuli not offered for choice. There were 84 subjects, of whom only 33 solved the task. Results for solvers and non-solvers were correlated separately with seven reference measures obtained from school records. A factor analysis was then performed on the data for solvers. The most important outcome was a factor determined principally by a vocabulary measure and the discrimination task of interest.

A66-81012

THE SCANNING CONTROL PRINCIPLE AND ITS RELATIONSHIP TO AFFECT MANIPULATION.

Robert Benfari (Grumman Aircraft Eng. Corp., Res. Dept., Long Island, N. Y.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 203-216. 12 refs.

An experiment was carried out with 32 subjects, using hypnosis as a means of inducing an affect state. The main purpose was to test the relationship between induced affect and cognitive-perceptual behavior. The design controlled for the effects of the organismic variable of scanning. The results gave weight to the hypothesis that cognitive controls can act as regulators of an intervening affect state. High scanning subjects made fewer errors in judgment during affect manipulation while limited scanners tended to increase their error scores. A theoretical tie-in with ego psychology is proposed.

A66-81013

COMPARISON OF CATEGORY AND MAGNITUDE SCALES OF TECHNICAL SKILLS.

Mark G. Pfeiffer and Arthur I. Siegel (Appl. Psychol. Serv., Sci. Center, Wayne, Pa.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 235-248. 23 refs.

Contract Nonr 2279(00).

Magnitude and category scaling methods were employed by journeymen electronics personnel to scale the apparent complexity of various aspects of their own job. The resultant data indicated that essentially equivalent scales were produced across the methods and that the continua of perceived complexity of 4 "activity" stimuli and of 16 "circuit" stimuli were metathetic. Since the distortions as the result of the introduction of different scaling methods were minimal, the present data suggested support for a single psychophysical law in the avionics job performance area.

A66-81014

SHADOW EFFECTS IN RECOGNITION OF COMPLEX TEXTURED SURFACES.

Norman E. Freeberg (Educ. Testing Serv., Princeton, N. J.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 251-256. 8 refs.

Recognition judgments of complex-textured relief surfaces were made under varying angles of a projected light source. Photos of these same and similar surfaces, taken under the identical light angles, served as the variable stimuli against which the recognition judgments were made. The extent to which shadow enhanced recognition was a function of the availability of other cues for recognition in the stimulus material. Addition of shadow could serve to degrade recognition as well, when pictorial information from which judgments were made contained minimal shadow.

A66-81015

PERSONNEL PSYCHOPHYSICS.

Mark G. Pfeiffer and Arthur I. Siegel (Appl. Psychol. Serv., Sci. Center, Wayne, Pa.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 257-258.

Contract Nonr 2279(00).

It was hypothesized that the psychophysical law would describe the relationship between perceived circuit complexity as judged by journeymen maintenance personnel and the actual number of complexity attributes of circuits as determined by professional engineers. Employing data independently derived from these two sources, the above hypothesis appears to have been verified.

A66-81016

A TABLE OF d' FOR A MODEL OF THE UNFORCED CHOICE EXPERIMENT.

M. M. Taylor and W. C. G. Fraser (Defence Res. Med. Labs., Toronto, Canada).

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 282.

This is a notice of a table of values of d' prepared for detection experiments, where the subject judges not only whether there was a signal but in which of two intervals it occurred. Models used in computation of d' are presented together with FORTRAN II programs for production of other tables of d' in cases with different assumptions about the probability distributions or with finer intervals of tabulation.

A66-81017

SERIES EFFECT IN MONOCULAR PERCEPTION OF SLANT.

A. H. Smith (Defence Res. Med. Labs., Toronto, Canada).

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 295-302. 9 refs.

In Exp. I, 24 observers viewed a circular disc monocularly, under reduced visual conditions, in the frontal-parallel plane and at geometric slants of 15°, 30°, 45°, and 60°, in random increasing and decreasing order of angles. Observers estimated slant by setting a tilt-rod from the vertical, the horizontal, and the position of the preceding response. The response pattern, increase in error to 30° or 45° and decrease to 60°, was stable for most conditions. Amount of error was affected by order and tilt-rod setting. The results for order and for the response and vertical initial settings of the tilt-rod were interpreted in terms of anchoring. The results for the horizontal initial setting were ascribed to extension of subjective reference scales. Exp. II tested the possibility that the results for order were due to figural aftereffect. Observers fixated the disc for 4 min. at 15° and later estimated its slant at 60°, and conversely. The results, relative to those for a control condition involving 4-sec. exposures of the disc, were negative.

A66-81018

A TEST FOR THE EFFECT OF NUMERICAL MAGNITUDE OF KNOWLEDGE OF RESULTS.

Jefferson L. Sulzer (Tulane U., Newcomb Coll., New Orleans, La.) and C. Michael Levy (Fla. U., Gainesville).

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 311-316. 6 refs. Grant NSF G-13794.

Subjects were given 3 guided training (T) trials, each followed by a free response, to learn to move a concealed lever 60°. No knowledge of results (KR) was administered. Six unguided countertraining (CT) trials followed, during which KR related to a target 20° above the origin was administered after each free response. A unit error of 2° was reported as 1, 10, 100, or 1000 units, depending upon the group. In the first post-KR trial and over all CT trials, no significant difference among the groups was observed. The Groups X Trials interaction was likewise nonsignificant. It was concluded that inflating error by "adding zeroes" was a very weak manipulation in this situation.

A66-81019

EYE MOVEMENTS AND THE VISUAL AUTOKINETIC PHENOMENON.

John E. Marshall (U. S. Army Med. Res. Lab., Fort Knox, Ky.)

Perceptual and Motor Skills, vol. 22, Feb. 1966, p. 319-326. 13 refs.

The autokinetic reports of 64 male subjects reflected to a significant extent the direction of compensatory eye movements which had been experimentally manipulated using a retinal image displacement technique. A tracking device was used to record the seconds per trial that the stimulus appeared in each of four visual field quadrants, a temporal measure of magnitude, latency, and direction of initial movement. The results suggest compensatory eye movements associated with the maintenance of single-point binocular fixation and consequent reduction of the disruptive effects of heterophorically stimulated fixation disparity, as the visual mechanism primarily responsible for the autokinetic phenomenon.

A66-81020

BODY COMPOSITION AND IT'S [SIC] CHANGES AS AN INDICATOR OF PHYSICAL FITNESS.

Jana Parizkova (Phys. Culture Res. Inst., Prague, Czechoslovakia).

Journal of the Association for Physical and Mental Rehabilitation, vol. 20, Jan.-Feb. 1966, p. 27-31. 18 refs.

Several previous determinations of the positive interrelationships of physical training, lean body mass, and maximum oxygen consumption in humans are reviewed. An investigation of the release of free fatty acids *in vitro* from adipose tissue in rats in response to different amounts of adrenaline demonstrated that there was greater release of free fatty acids in trained rats than in either control or restricted-activity animals. Estimations of deoxyribonucleic acid in adipose tissue revealed increased amounts in trained animals. The number of fat cells was proportionately greater in animals with a low total fat content, and vice versa.

A66-81021

DRUGS USED IN MOTION SICKNESS: A CRITICAL REVIEW OF THE METHODS AVAILABLE FOR THE STUDY OF DRUGS OF POTENTIAL VALUE IN ITS TREATMENT AND OF THE INFORMATION WHICH HAS BEEN DERIVED BY THESE METHODS.

J. J. Brand and W. L. M. Perry (Edinburgh U., Med. School, Dept. of Pharmacol., Great Britain).

Pharmacological Reviews, vol. 18, Mar. 1966, p. 895-924. 115 refs. Med. Res. Council and Roy. Naval Personnel Res. Comm. supported research.

A properly designed field study in humans remains the only valid way of determining whether a compound is effective against motion sickness. The variables which must be considered in a properly designed field study are

examined. They include speed of onset of action, degree of effectiveness, side-effects, and dosage. Field studies carried out so far have singled out five compounds which are valuable in the prevention of motion sickness: hyoscine, promethazine, cyclizine, meclizine, and diphenhydramine. Other histaminic compounds also are promising but for them there is less substantiating evidence. Comparative figures of drug potency for human and animal studies are listed. Information about the mode and site of action of motion sickness drugs is still very incomplete, as is the mechanism involved in stimulating the vomiting center.

A66-81022

GLUCONEOGENESIS IN KIDNEY CORTEX SLICES FROM COLD-EXPOSED RATS AND HAMSTERS.

Roy F. Burlington (Fitzsimons Gen. Hosp., U. S. Army Med. Res. and Nutr. Lab., Denver, Colo.)

Comparative Biochemistry and Physiology, vol. 17, Mar. 1966, p. 1049-1052. 9 refs.

The rate of gluconeogenesis from pyruvate, L-lactate, glycerol, alpha-ketoglutarate, L-glutamate, and L-aspartate was measured in kidney cortex slices prepared from control and cold-exposed albino rats and hamsters (*Mesocricetus auratus*). Experimental animals were kept at 5±1° C. for 7 or 14 days, while controls were maintained at 25±1° C. The capacity for gluconeogenesis was increased in both species after cold exposure, thus indicating a metabolic adaptation to cold which could supply glucose to support the elevated rate of heat production. The adaptation would be especially important when dietary carbohydrate intake is not sufficient to meet the energy demands imposed by cold.

A66-81023

ASSESSMENT OF INDUSTRIAL HEAT STRESS.

A. Henschel, F. Dukes-Dobos, C. M. Humphreys, W. Carlson, and D. H. K. Lee (PHS, Div. of Occupational Health, Cincinnati, Ohio).

American Industrial Hygiene Association Journal, vol. 27, Jan.-Feb. 1966, p. 13-16.

To define the problem of industrial heat stress requires, as a minimum, data on the actual climatic environment of the work site, the physiological and psychological demands of the job, the daily work-rest regimen, the heat exposure history, the health and nutritional status, the state of body hydration, the non-working physical environment with its seasonal variations, and the non-working activities of the individuals. A single controlled laboratory test that would give reliable and valid information about the thermal impact on a man of the total work-living would be desirable because of the difficulties of obtaining adequate data during industrial operations. An industrial heat stress study conducted by the Division of Occupational Health, USPHS, incorporated a simple standard laboratory type heat-work test along with an exhaustive study of the men at the work site. The physiological responses of the men to the standard tests were significantly correlated with the responses on the job and reflected the magnitude of the on-the-job environmental stress.

A66-81024

EVALUATION OF PROTECTIVE CLOTHING AND EQUIPMENT FOR OPERATIONS IN OXYGEN-RICH OR -DEFICIENT ATMOSPHERES APPROACHING -100° F.

Eugene E. Plumb, Edgar L. Mendenhall, and M. Chas. Robbins (Boeing Co., Aerospace Group, Seattle, Wash.)

American Industrial Hygiene Association Journal, vol. 27, Jan.-Feb. 1966, p. 29-38.

An investigation was conducted to evaluate protective clothing and equipment for personnel who might be required to work up to 90 minutes in the Saturn S-IC booster interstage prior to launch at temperatures approaching -100° F. Because the environment might be either oxygen-rich or -deficient, the selected material must be compatible with liquid oxygen. Subjects wore arctic clothing (estimated clo value 4.5) and respiratory equipment. In the cold environment they performed tasks simulating those which would be required in the booster interstage. The exposure times were varied from 15 to 57 minutes. The limiting parameters appear to be communications, visibility, and satisfactory respiratory protection at this temperature. Arctic clothing and wrap-around or thermal-air respirators provided thermal protection for 50 minutes in an oxygen-rich rich or normal air composition. Airlite models with emergency egress bottles or Draeger units provided breathable air for 30 minutes in an oxygen-deficient environment.

A66-81025

ETHANOL POTENTIATION OF HALOGENATED ALIPHATIC SOLVENT TOXICITY.

Herbert H. Cornish and Julita Adefuin (Mich. U., Inst. of Ind. Health and School of Public Health, Dept. of Ind. Health, Ann Arbor).

(*Am. Ind. Hyg. Assn., Ann. Meeting, Houston, Tex., May 6, 1965*).

American Industrial Hygiene Association Journal, vol. 27, Jan.-Feb. 1966, p. 57-61. 10 refs.

Grant PHS OH-28.

The potentiating action of prior ethanol ingestion on the toxicity of carbon tetrachloride, trichloroethylene, perchloroethylene, and 1,1,1-trichloroethylene was measured in rats. Ethanol potentiation of toxicity, as measured by serum enzyme response, was demonstrated only after exposure to carbon tetrachloride or trichloroethylene. Blood serum enzyme determinations were made on glutamic-oxalacetic transaminase, glutamic-pyruvic transaminase, and isocitric dehydrogenase.

A66-81026

AN EVALUATION OF SELECTED METHODS OF COLLECTION AND ANALYSIS OF LOW CONCENTRATIONS OF OZONE.

Russell H. Hendricks and Lee B. Larsen (PHS, Occupational Health Field Sta., Salt Lake City, Utah).

American Industrial Hygiene Association Journal, vol. 27, Jan.-Feb. 1966, p. 80-84. 20 refs.

Seven analytical methods for ozone are evaluated. Equipment used for generating ozone is discussed. Information concerning methods of collection of ozone is presented. Potassium iodide, phenolphthalein, sodium diphenylamine, sulfonate, and fluorexstibene methods are either nonspecific for ozone or lack sensitivity. The dimethoxystilbene method, in our hands, lacked sensitivity and posed reagent difficulties. The nitrogen dioxide-equivalent method is the method of choice for field investigations where fluctuating nitrogen dioxide concentrations are not encountered. The rubber-cracking method, although less precise, is simple, convenient, and a useful indicator in survey work, especially for preliminary surveys.

A66-81027

CHANGES IN THREE BLOOD COMPONENTS AS A RESULT OF A STRESS SITUATION.

Rudolph L. Zlody (Coll. of Holy Cross, Worcester, Mass.)

Psychosomatics, vol. 7, Jan.-Feb. 1966, p. 14-18. 21 refs.

Changes in blood pH, erythrocytes, and leukocytes were measured in 19 subjects under stress and compared to normal values. Stress initiated a shift of acid-base concentration in a decidedly alkaline direction, but the heightened values remained within normal limits. Significant increases (from 3.8% to 216.6%) occurred in erythrocyte number. Seventeen subjects showed an increased leukocyte count during stress; the remaining two showed a drop in white-cell count. The positive range of increases was from 1.7% to 102.3%. The mean erythrocyte number before stress was 4.07 million per cc., and during stress the number increased to 7.64 million. The mean leukocyte number before stress was 5900 cells per cc., the mean number during stress was 8200 cells per cc. The range of pH values before and during stress was exactly the same.

A66-81028

NEUROTOXICITY OF HYPERBARIC OXYGEN (NEUROTOXICITE DE L'OXYGENE HYPERBARE).

G. Bertharion and L. Barthelemy.

Societe de Medecine Militaire Francaise, no. 10, Dec. 9, 1965, p. 595-600. In French.

Epileptic-like convulsions appear in organisms subjected to oxygen partial pressure above 1.7-2.0 kg./cm.². Electrocardiograms recorded during convulsions in albino rats subjected to 98% oxygen at a pressure of 5 kg./cm.² demonstrated that increased cortical excitability was followed by increased electrical activity of the medullary reticular formation and the thalamus. Of 16 groups of compounds tested in rats and mice, THAM (tris-hydroxymethyl-aminomethane), serotonin, novocain, sodium hydroxybutyrate, quinihydrone, and manganese prevented or delayed the onset of convulsions.

A66-81029

THE EFFECT ON THE BODY OF SMALL CONCENTRATIONS OF PHENOL AND ACETOPHENONE PRESENT IN THE ATMOSPHERE OF SETTLEMENTS [K VOPROSU O DEISTVII NA ORGANIZM MALYKH KONTSENTRATSII FENOLA I ATSETOFENONA PRI SOVMESTNOM PRISUTSTVII IKH V ATMOSFERNOM VOZDUKHE NASELENNYKH MEST].

IU. E. Korneev (USSR, Acad. of Med. Sci., A. N. Systn Inst. of Gen. and Communal Hyg., Moscow).

Gigiena i Sanitariia, no. 9, Sep. 1965, p. 15-22. 11 refs. In Russian.

In humans the olfactory threshold for concentration of phenol and acetophenone in the ambient air was found to be 0.22 mg./m.³ and 0.01 mg./m.³, respectively. When both compounds were present, the threshold concentration of phenol was 0.013 mg./m.³ and 0.004 mg./m.³ for acetophenone. Experiments with white rats showed that exposure of animals for 84 days to air containing phenol (0.0637 mg./m.³) and acetophenone (0.01732 mg./m.³) caused changes in the motor chronaxy of antagonist muscles, cholinesterase activity, porphyrin metabolism, concentration of 17-corticosteroids in urine, and eosinopenia. In industrial zones the concentration of both compounds should not exceed the coefficient 1.2 of their permissible concentrations.

A66-81030

ORIENTATION IN WEIGHTLESSNESS [ORIENTATSIYA V BEZOPORNOM PROSTRANSTVE].

V. Stepantsov, A. Eremin, and I. Kolosov.

Aviatsiya i Kosmonavtika, no. 11, Nov. 1965, p. 36-38. In Russian.

Theoretical calculations and experimental results show that in the average man, 168-170 cm. in height and weighing 70-75 kg. the moment of inertia of the outstretched arm relative to the axis of the shoulder joint equals 0.6 kgm.². The moment of inertia of the separated legs at an angle of 120-140°, relative to sagittal line, is equal to 3.9-4.4 kgm.². These facts are important in the choice of mechanisms of locomotion in the state of weightlessness.

A66-81031

THE EFFECT OF ROTATION AND TILT ON THE MAGNITUDE OF THE POGGENDORF ILLUSION.

H. Lethowitz and S. Toffey (Pa. State U., University Park).

Vision Research, vol. 6, Feb. 1966, p. 101-103.

NASA Grant NSG 496 and Grant PHS MH 08061.

Subjects were presented with a series of 15 Poggendorf figures at four angles of rotation with three angles of tilt. The results indicate that the magnitude of the Poggendorf illusion is strongly dependent on both the orientation and tilt of the test object. The angular relationships with respect to the observer, as well as within the figure, appear to be important variables in determining the magnitude of the illusion. The mechanism of this phenomenon is not known.

A66-81032

ENHANCEMENT OF OCCIPITO-CORTICAL RESPONSES TO LIGHT FLASHES IN MAN DURING ATTENTION.

M. W. van Hof, J. van Hof-van Duin, and W. J. Rietveld.

Vision Research, vol. 6, Feb. 1966, p. 109-111. 7 refs.

Subjects with constant average evoked potentials to light flashes and the ability to focus continuously on the central dot or small light hole were stimulated by a series of flashes with each disk or ring in a random sequence. The results show that when a relatively small light source is used, a minor improvement in fixation can cause a considerable enlargement of the occipito-cortical response, and may add up to enhancement due to some centrally active "attention mechanism". This factor increases with a decrease of the relative size of the light source.

A66-81033

THE EFFECT OF UPRIGHT POSTURE ON RIGHT VENTRICULAR VOLUMES IN PATIENTS WITH AND WITHOUT HEART FAILURE.

Elliot Rapaport, Maylene Wong, Edgardo E. Escobar, and Gilberto Martinez (Calif. U. School of Med., Dept. of Med. and Cardiovascular Res. Inst., San Francisco; and San Francisco Gen. Hosp., Cardiopulmonary Lab., Calif.)

American Heart Journal, vol. 71, Feb. 1966, p. 146-152. 27 refs.

Grants PHS HE-06285, FR-83, and 2-FO 5-TW-605-02; and San Francisco Heart Assoc. supported research.

The effects of posture on stroke volume, right ventricular end-diastolic and end-systolic volumes, cardiac output, and heart rate were studied in subjects without heart disease and patients with congestive heart failure. Cardiac catheterization was performed, and right ventricular volumes were measured by combining a direct Fick cardiac output determination with a thermodilution technique, while the subjects were supine and after they had been tilted to a 60-degree upright position. In the normal subjects, upright tilting resulted in a profound fall in stroke volume, an increase in heart rate, and a significant decrease in the size of the right ventricle, although the residual fraction increased. In contrast, in subjects with congestive heart failure, tilting to the upright position caused no significant changes.

A66-81034

EFFECT OF WAVELENGTH AND BANDWIDTH OF RED LIGHT ON RECOVERY OF DARK ADAPTATION.

Mary M. Connors (U.S. Naval Submarine Med. Center, Submarine Med. Res. Lab., U.S. Naval Submarine Base, Groton, Conn.)

Journal of the Optical Society of America, vol. 56, Jan. 1966, p. 111-115. 11 refs.

Recovery curves were run following 1- and 5-min. adaptation to wavelengths ranging from 595 to 670 mμ taken at 15-mμ intervals at a luminance of 100 ft.-L. The effects of near-monochromatic and broad band-widths were investigated. Recovery curves are in terms of time necessary to return to a predetermined dark-adapted threshold and to stated values above that threshold. After one minute of adaptation to a light of 610 mμ, recovery is faster than after exposure to an equally bright light of 595 mμ. Lengthening the wavelength causes no further reduction in recovery time. After five minutes of similar adaptation, recovery time is progressively shortened by lengthening the wavelength to 640 mμ. Further increases in wavelength result in recovery times equivalent to those of the 640 mμ adaptation. Spreading the bandwidth from near monochromatic to 30 mμ has no effect on subsequent recovery, although further broadening the bandwidth to include the shorter wavelengths results in reduced sensitivity for the 595-mμ setting. These findings are consistent with luminosity theory.

A66-81035

FINE EYE MOVEMENTS DURING INATTENTION.
Kenneth Gaarder (Chestnut Lodge Res. Inst., Rockville, Md.)
Nature, vol. 209, Jan. 1, 1966, p. 83-84. 5 refs.

The difference in fine eye movements during attention and inattention while a subject is directed to look at a target indicate the existence of a feedback control system. The fine eye movements invariably present, beyond voluntary control, consist of three components: rapid saccades, slow drift and waver, and fine fast tremor. When each subject, after a phase of inattention, was instructed to concentrate on eye fixation, the eye movement reverted to normal pattern, and the subject became retrospectively aware of his inattention. These changes were oscillatory. It is suggested that during attention there is a closed-loop feedback with a steady function, while during inattention the loop is open.

A66-81036

COMPARISON OF EFFECT OF ENVIRONMENTAL AND PREOPTIC HEATING AND PYROGEN ON PLASMA CORTISOL.

I. Chowder, H. T. Hammel, J. Eisenman, R. M. Abrams, and S. M. McCann (Pa. U., School of Med., Dept. of Physiol., Pa.; and John B. Pierce Found. Lab., New Haven, Conn.)

American Journal of Physiology, vol. 210, Mar. 1966, p. 606-610. 14 refs.
Contracts AF 33(657)-11103 and AF-AFOSP-62-133 and Grant PHS AM-01236-09.

Elevation of preoptic temperature by means of implanted thermodes activated heat-loss mechanisms and produced a significant elevation of plasma cortisol levels in dogs. Both the temperature-regulatory response and the elevation in plasma cortisol were not sustained during continued preoptic warming. Sudden elevation of environmental temperature evoked a sustained temperature-regulatory response and elevation in plasma cortisol. Only a minimal elevation in cortisol was observed when environmental temperature was gradually raised. When bacterial pyrogen was injected, a more marked elevation in plasma cortisol occurred. Plasma cortisol began to rise before an appreciable rise in body temperature was present and declined while body temperature was still elevated.

A66-81037

COMPUTER SIMULATION AND PSYCHOLOGICAL THEORIES OF PERCEPTION.

John W. Gyr, John S. Brown, Richmond Wiley, and Arthur Zivian (Mich. U., Ann Arbor).

Psychological Bulletin, vol. 65, Mar. 1966, p. 174-192. 50 refs.
Grants NIH M6155 and PO 1 HDO 1368-01.

Computer simulations of perceptual processes have often not related directly to questions of concern to the psychology of perception and, in particular, have regarded perception as a sensory, as opposed to a sensorimotor or active, process. Some of the psychological literature which is relevant to the issue of perception as a passive vs. an active process is reviewed and the differences between these alternative conceptions of perception and the gains to be derived from using the active-perceiver model are spelled out. Past computer models are reviewed in the light of such psychological theories of perception. A different simulation program based explicitly on the active-perceiver model of perception is then sketched in broad outlines and its potential for doing research upon psychological problems is reviewed.

A66-81038

MECHANISM OF THE FIGURAL AFTEREFFECTS.

Leo Ganz (Calif. U., Riverside).

Psychological Review, vol. 73, Mar. 1966, p. 128-150. 60 refs.

It is suggested that the figural aftereffects are actually a species of simultaneous illusion in which the afterimage of the inspection object acts as an inducing figure. The afterimage displaces the test contour in phenomenological space because the inducing contour exerts inhibition on the test contour. A simple mathematical theory is described which accounts for the spatial distribution of displacements.

A66-81039

VIGILANCE—AROUSAL VS. REINFORCEMENT.

Hans Christoph Micko (Göttingen U., Sweden).

Quarterly Journal of Experimental Psychology, vol. 18, Feb. 1966, p. 39-46. 15 refs.

Task-irrelevant stimuli (projected jokes, which were difficult to read) received an increasing attention as the auditory vigilance session progressed. This result supports reinforcement theories at the cost of activation theory of vigilance.

A66-81040

GROUP PERFORMANCE AS A FUNCTION OF TASK DIFFICULTY AND SIZE AND STRUCTURE OF GROUP: II.

Julian O. Morrisette (Behavioral Sci. Lab., Wright-Patterson AFB, Ohio).
Journal of Personality and Social Psychology, vol. 3, Mar. 1966, p. 357-359.
Contract AF 33(657)-10456.

Performance data on 3-man groups was obtained in wheel (W) and circle (C) structures, and two levels of task difficulty, H=1.6 and H=2.4. These data are compared with those obtained on 4- and 5-man groups under identical conditions. Ten groups were run under each condition, with each group given 15 problems to solve. Problem solution-time and error data were collected. The problem solution time data show the following: (a) in C structures, as group size increases performance deteriorates; (b) in W structures there is no relationship between group size and performance; (c) as group size decreases, the effect of structure on performance decreases. In the error data, only structure produced a significant effect, with W structures making fewer errors than C.

A66-81041

STUDIES ON THE EFFECT OF RADIO-FREQUENCY WAVES ON BIOLOGICAL MACROMOLECULES.

Shiro Takashima (Pa. U., Moore School of Elec. Eng., Electromed. Lab., Philadelphia).

IEEE Transactions on Bio-Medical Engineering, vol. BME-13, Jan. 1966, p. 28-31. 7 refs.

U. S. Army supported research.

The effects of high-frequency electric field on the activity of the enzyme alcohol dehydrogenase and on the structure of deoxyribonucleic acid (DNA) were examined. To avoid the effects of heating, a pulsed electric field was used, and samples were rigorously cooled. The enzyme activity and the nucleic acid structure were not altered, even by prolonged exposure to high-field intensity between 1 and 60 Mc/s.

A66-81042

EGO FUNCTIONS AND DREAMING DURING SLEEP ONSET.

Gerald Vogel, David Foulkes, and Harry Trosman (Chicago U., Dept. of Psychiat., Ill.)

Archives of General Psychiatry, vol. 14, Mar. 1966, p. 238-248. 22 refs.
Grants Natl. Inst. of Mental Health M-04151 and State of Ill. 17-165.

The psychology of the sleep onset period was studied by gathering reports from four sequential electroencephalogram/electrooculogram (EEG/EOG) stages which mark the period from relaxed wakefulness to unequivocal sleep. These reports were rated for the performance of two ego functions: (1) the maintenance of secondary process mentation, and (2) the maintenance of contact with the external world. A sequence of three ego states was found during sleep onset—initially both functions are preserved, a little later there is both regressive content and withdrawal with loss of reality testing. Although there is considerable correspondence between the ego states and EEG stages during sleep onset, it is not a perfect correlation. A psychodynamic explanation is offered of the sequence of ego states during sleep onset. The initial loss of contact with the external world induces regressive changes in the ego. Thought regression appears as an unavoidable side effect of the reduced sensory input. Loss of reality testing which precedes the reappearance of nonregressive content is a defense against the ego threat of regression. This defense allows sleep to continue.

A66-81043

A CONCEPTUAL MODEL OF SLEEP.

Kenneth Gaarder (Natl. Inst. of Mental Health, Clin. Neuropharmacol. Res. Center and St. Elizabeths Hosp., Clin. Studies Center, Washington, D. C.)
(Assoc. for Psychophysiol. Study of Sleep, Meeting, Washington, D. C., Mar. 28, 1965).

Archives of General Psychiatry, vol. 14, Mar. 1966, p. 253-260. 24 refs.

A general systems model of sleep is presented, using analogy to general purpose digital computers. It is proposed that two main functions of sleep are to destructure or erase data storage and to reinforce the program (character) of the organism. Single cell studies and other recent research are interpreted as supporting the model. The model is used to reconcile observations of changed sensory input, changed sleep need, character patterns, and brain changes.

A66-81044

EXPOSURE CRITERIA FOR FLUORINE ROCKET PROPELLANTS.

Peter M. Ricca (NASA, John F. Kennedy Space Center, Cape Kennedy, Fla.)
(Fourth Inter-Am. Conf. on Toxicol. and Occupational Med., Miami, Fla., Aug. 24-27, 1964).

Archives of Environmental Health, vol. 12, Mar. 1966, p. 399-407. 13 refs.

Space vehicles currently being developed use liquid fluorine (LF₂) as well as liquid fluorine and oxygen mixtures (FLOX), which generally cannot be totally contained even in closed, zero-loss handling systems. Releases into the atmosphere usually involve fluorine/hydrogen fluoride (F₂/HF) mixtures, both of which cause irritation of epithelial tissues, especially of the eyes and respiratory tract in low concentrations and irreversible detrimental effects to health at high concentrations. The chemical and physical properties, and the

physiological and toxicological effects of both substances are outlined. In previous animal studies, fluorine was more toxic than HF in both tolerance thresholds and species susceptibility. Two toxicity guidelines have been used in the aerospace industry: Emergency Tolerance Limit (ETL) and Emergency Exposure Limit (EEL). The limits differ only in the degree of risk accepted. The assumptions on which the EEL and ETL are based are summarized. In humans, short-term exposures to fluorine at 20 mg./m.³ for five minutes should not cause irreparable respiratory damage, and 5 mg./m.³ for short single exposures should be tolerable from a comfort standpoint.

A66-81045

ALGICIDAL EFFECT OF BROMINE AND CHLORINE ON CHLORELLA PYRENOIDOSA.

Yehuda Kott, Gaila HersHKovitz, A. Shemtob, and J. B. Sless (Israel Inst. of Technol., Sanit. Eng. Labs., Haifa, Israel).

Applied Microbiology, vol. 14, Jan. 1966, p. 8-11. 16 refs.

Chlorella pyrenoidosa was found to grow rapidly in tap water. Peak growth was reached after 2 to 3 days. Chlorine and bromine, added to such water, were effective inhibitors of algal growth. Bromine and bromamine were primarily algicidal, whereas chlorine and chloramines were mainly algistatic. It is assumed that the mechanisms of action of these halogens on *Chlorella* are not the same.

A66-81046

RESISTANCE OF THE ADULT AND OF THE YOUNG MOUSE TO PROLONGED HYPOTHERMIA AT 20° C. OBSERVATIONS CARRIED OUT ON 500 ANIMALS [RESISTANCE DE LA SOURIS ET DU SOURICEAU A L'HYPOTHERMIE PROLONGEE A 20° C. OBSERVATIONS PORTANT SUR PRES DE 500 ANIMAUX].

J. Flatin and M. Delsol (J. Catholique, Lab. de Biol. gen., Lyon, France). *Experientia*, vol. 22, Feb. 15, 1966, p. 94-96. 6 refs. In French.

Adult and young mice were maintained at 20-23° C. (rectal temperature) without pharmacodynamic agents. In both groups, approximately 43% survived 20-30 hours, about 17% lived 30-40 hours, and about 5% survived 40-48 hours. A small number of animals lived 48-50 hours. Injections of serum containing glucose increased survival to 70 hours in some animals. No difference in resistance to hypothermia was noted between males and females, or between young mice and adult mice.

A66-81047

PERSISTING CIRCADIAN RHYTHM IN HEPATIC GLYCOGEN OF MICE DURING INANITION AND DEHYDRATION.

E. Haus and F. Halbert (Minn. U., Med. School, Dept. of Pathol., Minneapolis). *Experientia*, vol. 22, Feb. 15, 1966, p. 113-114. 12 refs.

NASA Grant NSG-517, Grant PHS 5-K6-FM-13, and Elsa U. Pardee Found. supported research.

Liver glycogen concentrations were measured in three groups of mice: two groups in which all food or all food and all water was removed 16 hours prior to sampling, and the third group which was given food and water ad libitum. In the fully fed and fully watered animals, the liver glycogen concentration varied predictably as a function of time. The starving and thirsting as well as the starving animals showed persisting circadian rhythms similar to the rhythms of fully-fed and fully-watered mice.

A66-81048

CARDIAC INJURY AND CARBON MONOXIDE POISONING.

Norman Jaffe (Edenvale Hosp., Dept. of Med., Johannesburg, South Africa). *South African Medical Journal*, vol. 39, Jul. 24, 1965, p. 611-615. 7 refs.

Sixteen cases of carbon monoxide poisoning in Africans are recorded. The pathology of the condition is described and the pathophysiology is reviewed. The presence of electrocardiographic abnormalities in carbon monoxide poisoning is discussed. Attention is drawn to the abnormalities of the serum enzymes glutamic oxalacetic transaminase, glutamic pyruvic transaminase, and lactic dehydrogenase, in association with the myocardial injuries.

A66-81049

DAILY URINARY EXCRETION OF CALCIUM IN PARTLY IMMOBILIZED PATIENTS WITH PALSIES OR IN PLASTER CASTS [DOBOWE WYDALANIE WAPNIA W MOCZU U CHOROZYCH CZESCIOWO UNIERUCHOMIONYCH Z POWODU PORAZEN LUB OPATRUNKOW GIPSOWYCH].

Stefan Syc and Adam Wedrychowicz.

Wiadomosci Lekarskie, vol. 18, Oct. 15, 1965, p. 1579-1583. 10 refs. In Polish.

Urinary calcium excretion during 24 hours was investigated in 22 patients, who were partly immobilized: 4 of them had paraparesis due to fractures of the vertebral column, 9 had fractures of the limbs and 9 were immobilized because of operations and plaster casts. This group of immobilized patients was compared with 18 patients newly admitted to the hospital because of various diseases. In the control group the normal amount of excreted calcium was 114 mg. during 24 hours. In the group of patients with palsies average calcium excretion was 434.5 mg. during 24 hours, in the group with fractures it was 168 mg. during 24 hours. In the group of patients without palsies or fractures who had been immobilized because of other conditions calcium excretion was 120 mg. during 24 hours on the average and it was within normal limits. The amount of calcium excreted with urine is usually proportional to the duration of immobilization. Intensive movements carried out with healthy limbs bring to normal level the amount of calcium excreted during 24 hours in partly immobilized patients.

A66-81050

ELECTROPHYSIOLOGICAL OBSERVATIONS ON ONE CAT DURING A MISSILE FLIGHT [ETUDE NEUROPHYSIOLOGIQUE EFFECTUEE SUR UN CHAT LORS D'UN VOL EN FUSEE].

G. Chateller and P. Buser (Centre d'Etudes et Rech. de Méd. aéron. et Fac. des Sci., Lab. de Neurophysiol. comparée, Paris, France).

Journal de Physiologie, vol. 57, Nov.-Dec. 1965, p. 787-798. In French.

Electrophysiological observations were performed on one cat during a missile flight with a zero-gravity period of approximately five minutes. Records were taken from the cortical suprasylvian gyrus and somatic area 1, and from the ventral hippocampus. The general activity was considered, as well as primary responses evoked by stimulation of the contralateral forepaw. A strong neocortical activation appeared during the propulsion phase. Sustained slow patterns developed during the zero-gravity period. No hippocampal theta activity was observed. Only slight variations of the somesthetic evoked potentials were noticed. No "abnormal" rhythms appeared at any period of the flight.

A66-81051

PULMONARY CIRCULATION TIME IN DOGS AT CONTROLLED RESPIRATION OF A MIXTURE CONTAINING 5% CO₂ IN AIR [IL TEMPO DI CIRCOLO POLMONARE IN CANI A RESPIRAZIONE CONTROLLATA IN MISCELA CONTENENTE IL 5% DI CO₂ IN ARIA].

G. Giordano, A. M. Verde, G. Mastroberardino, and A. Dagianti (Rome U., Ist. di Clin. Med. gen. e Terapia Med., Italy).

Archivio di Fisiologia, vol. 64, Dec. 10, 1965, p. 22-25. 7 refs. In Italian.

Pulmonary circulation time, arterial pressure, and resistance were studied in dogs under controlled respiration in air and in a hypercapnic mixture (5% carbon dioxide in air). If the mechanical effects following hyperventilation by carbon dioxide are excluded, no change was evident in any pulmonary function investigated. The results indicate that, at 5% concentration, carbon dioxide does not alter pulmonary vascular flow or tone.

A66-81052

AN OUTLINE FOR SETTING SIGNIFICANT TESTS OF MUSCULAR PERFORMANCE.

P. Margaria (Milan U., Ist. di Fisiol. umana, Italy).

(Symp. on Human Adaptability and Its Methodol., Kyoto, Japan, Sep. 14, 1965).

Archivio di Fisiologia, vol. 64, Dec. 10, 1965, p. 37-44. 6 refs.

Known metabolic energy sources of muscular activity are presented, and the principles are outlined for planning comprehensive tests to study the energetic aspects of muscular activity, in terms of work rate (power) as related to the duration of the exercise, total work performed, mechanical efficiency, and oxygen debt contraction and payment.

A66-81053

CONCISE REPRESENTATION OF SOME FUNDAMENTAL RESPIRATORY AND CIRCULATORY DATA [UNA RAPPRESENTAZIONE CONCISA DI ALCUNI FONDAMENTALI DATI FUNZIONALI RESPIRATORI E CIRCOLATORI].

R. Margaria (Milan U., Ist. di Fisiol. umana, Italy).

Archivio di Fisiologia, vol. 64, Dec. 10, 1965, p. 45-58. 28 refs. In Italian. Consiglio Nazl. delle Ric. supported research.

In a single chart the maximal oxygen consumption and cardiac output are plotted as a function of the heart rate and of alveolar ventilation. On the same chart the oxygen tension, the stroke volume, the ventilation-perfusion coefficient of the lungs, and the alveolar partial pressure of CO₂ are visualized. In a second chart the artero-venous oxygen difference is given as a function of oxygen pulse and oxygen capacity of the blood; the stroke volume and the artero-venous difference in saturation of the blood with oxygen are included. The charts may be used to determine the effects of environmental changes and drug introduction on circulatory and respiratory functions.

A66-81054

MILITARY AVIATION AND EXPERIMENTAL PSYCHOLOGY [PILOTAGE MILITAIRE ET PSYCHOLOGIE EXPERIMENTALE].

A. de Brisson and J. Brémont.

Forces Aériennes Françaises, vol. 20, Feb. 1966, p. 185-218. In French.

Aptitude and testing methods are discussed for pilots, navigators, and radio-navigators. Selection, prediction, and limitations of techniques are considered.

A66-81055

MOTOR WORK AND RESISTANCE IN HUMAN MUSCLE [LAVORO MOTORE E LAVORO RESISTENTE DEL MUSCOLO UMANO].

A. Pina (Milan U., Ist. di Fisiol. umana, Italy).

Archivio di Fisiologia, vol. 64, Dec. 10, 1965, p. 79-97. 16 refs. In Italian.

The working capacity of the human brachial biceps was studied during positive and negative work by means of a force-velocity diagram. In the positive work, the force of the muscle decreased with increasing speed of movement following an hyperbolic function. In the negative work, the force opposed by the muscle was constant, i.e., independent of the speed of movement, somewhat greater than the force of the isometric stretch. From the force-velocity diagram, the power-velocity diagram was calculated. The total power values dissipated by the friction for both positive and negative work were calculated as the speed of change of length of 0.05 m./sec., as 3 and 12 kgm./sec., respectively. The mechanical efficiency was also calculated and found to be 0.25 for positive and 1.20 for negative work. The total maximum power had the same value for the positive and for the negative work. The mechanically utilized power was 4.5 times greater in negative than in positive work. This is interpreted by considering the contribution of the internal frictions, which are in opposition to the force exerted by the contracted muscle in the positive work, while they have the same direction in the negative work.

A66-81056

NEW LEARNING MACHINES FOR FUTURE AEROSPACE SYSTEMS.

D. R. Moore and A. C. Speake (USAF Avionics Lab., Wright-Patterson AFB, Ohio).

New Scientist, vol. 29, Mar. 10, 1966, p. 626-628.

A brief history of human attempts to duplicate living functions such as flying and echo-location by engineering is given. For the control of satellites and high speed aircraft, self-organizing, highly flexible computers are being devised which will work out by experience the best way to reach a preset goal. Such two input/one-output digital devices of the Probability State Variable (PSV) class are described, with a block diagram and two possible control networks.

A66-81057

EFFECT OF POSTURE ON FORMATION AND EVACUATION OF LYMPH.

R. Entrup, D. Palewonsky, M. Hughes, J. Jue, D. Bittar, and R. Wegria (St. Louis U., School of Med., Dept. of Pharmacol., Mo.).

American Journal of Physiology, vol. 210, May 1966, p. 943-949. 21 refs. Grant PHS HE-09031; PHS and Life Insurance Med. Res. Fund supported research.

In the anesthetized dog, tilting of the whole animal, hindlimbs downward, first stopped or markedly decreased the thoracic duct lymph flow which then returned to or above control level. On return of the dog to the horizontal position, the thoracic duct lymph flow rose above control and tilting levels, reaching immediately its maximal value then returning to control gradually. It is concluded that during tilting, gravity interferes with the evacuation of lymph and interstitial fluid. The present work indicates that gravity is an important factor in the pathogenesis of edema not only because it increases capillary filtrate formation and hence lymph formation but also because it interferes with the evacuation of tissue fluids and lymph; and that the evacuation of tissue fluids and lymph and its determinants are an important factor in the lymph circulation.

A66-81058

HEART RATE AND BLOOD PRESSURE DURING EXERCISE IN DOGS WITH AUTONOMIC DENERVATION.

Edmundo Ashkar (Inst. de Biol. y Med. Exptl., Buenos Aires, Argentina).

American Journal of Physiology, vol. 210, May 1966, p. 950-952. 17 refs. Grant PHS CA-04745-05 and Rockefeller Found. supported research.

In 21 dogs with various degrees of autonomic denervation, continuous recording of mean aortic blood pressure was made during treadmill exercise at 7.5 km./hr. and a 10% grade. A marked fall of blood pressure was caused by exercise both in the totally denervated dogs and those denervated but with the stellate ganglion intact (17 and 30% respectively). In dogs bilaterally vagotomized and sympathectomized from T₁ to T₇ with bilateral ablation of lumbar sympathetic chains, blood pressure increased by about 16% to 127 mm. Hg. These dogs, and those with intact stellate ganglion, showed a heart rate increase of about 30% whereas in dogs deprived of all sympathetic

chains, cardiac acceleration was negligible. Heart rate increased about two fold in control dogs whereas blood pressure increased by 16% to 113 mm. Hg. It is suggested that heart rate limitation was not responsible for decreased blood pressure in denervated dogs.

A66-81059

FEMORAL ARTERIAL CIRCULATION IN NONHYPOXIC DOGS AT REDUCED BAROMETRIC PRESSURES.

S. F. Marotta and D. J. Boon (Ill. U., Med. Center, Dept. of Physiol., Chicago).

American Journal of Physiology, vol. 210, May 1966, p. 953-956. 12 refs.

Femoral arterial blood flow and related cardiopulmonary parameters were monitored in 72 anesthetized dogs during exposure to altitude while breathing gas mixtures containing 100% O₂ or oxygen and nitrogen with a P_{O₂} of 150 mm. Hg. One series was first dinitrogenated with 100% O₂ at ground level. Results showed that there were similar decreases in flow in animals breathing either the 100% O₂ or the P_{O₂} 150 mm. Hg. mixtures at 9,000, 17,000, and 25,000 ft., but no decrease in the animals previously dinitrogenated. Initial and final flows in the latter, however, were all less than in the animals not previously dinitrogenated. Dinitrogenation at altitude, therefore, even in the presence of a normal P_{O₂} and at as low an altitude as 9,000 ft., apparently is a major cause of the decrease in femoral arterial flow.

A66-81060

RISK OF MORTALITY IN INTERRUPTED EXPOSURE TO 100% O₂: ROLE OF AIR VS. LOWERED P_{O₂}.

Ronald A. Wright, Harold S. Weiss, Edwin P. Hiatt, and Jagdish S. Rustagi (Ohio State U., Dept. of Math. and Coll. of Med., Dept. of Physiol., Environ. Physiol. Lab., Columbus).

American Journal of Physiology, vol. 210, May 1966, p. 1015-1020. 19 refs. NASA Grant NSG-295-62.

Four hours per day in air was the shortest interruption of an exposure to 100% O₂ at 1 atm. (OAP) which produced in mice a significant prolongation of survival time. Risk of mortality was reduced to one-fourth that of continuous exposure and time to death of half the animals was increased from 5 days to 15. An almost identical effect on mortality was observed when the 4-hr. daily period out of OAP was in 100% O₂ at a pressure of 200 ± 5 mm. Hg. These results indicate that the presence or absence of N₂ in the interrupting atmosphere plays little role in the prolongation of survival time and cast doubt on obstructive atelectasis as a mechanism in O₂ toxicity. Water intake was found to be a useful and simple technique for following the course of toxicity. Statistics utilizing the risk of mortality concept proved to be convenient for analyzing truncated time-mortality data.

A66-81061

REGIONAL DISTRIBUTION OF VENTILATION AND PERFUSION AS A FUNCTION OF BODY POSITION.

K. Kaneko, J. Milic-Emili, M. B. Dolovich, A. Dawson, and D. V. Bates

(McGill U. Clin., Roy. Victoria Hosp., Joint Cardiorespirat. Serv., Montreal, Canada).

Journal of Applied Physiology, vol. 21, May 1966, p. 767-777. 27 refs.

John A. Hartford Found. Inc., U.S., Med. Res. Council, and J. Louis Levesque Found., Canada supported research.

Regional subdivisions of lung volume and the distribution of pulmonary ventilation and perfusion were studied using xenon¹³³ in eight normal subjects in supine, prone, and right and left lateral positions. In all postures, the regional residual volume, functional residual capacity, and expiratory reserve volume were relatively greater in upper than in dependent lung regions; the regional inspiratory and vital capacities were, by contrast, greater in dependent zones. Except at lung volumes lower than the functional residual capacity, pulmonary ventilation and perfusion were greater in dependent than in upper zones in all postures, indicating that distribution of both ventilation and perfusion is gravity dependent. Differences in ventilation were constant in relation to the vertical axis whatever the body position, and presumably are to be ascribed to regional differences in pleural pressure, which in turn are related to the weight of the lungs. The distribution of perfusion down the vertical axis varied somewhat between the different body positions, but was related to the relative magnitudes of regional pulmonary vascular and alveolar pressures.

A66-81062

EFFECT OF GRAVITY ON THE DISTRIBUTION OF PULMONARY VENTILATION.

A. C. Bryan, J. Milic-Emili, and D. Pengelly (Roy. Can. AF Inst. of Aviation Med., Toronto and McGill U., Roy. Victoria Hosp., Joint Cardio-Respirat. Serv., Montreal, Canada).

Journal of Applied Physiology, vol. 21, May 1966, p. 778-784. 18 refs. Defence Res. Board, Canada supported research.

Regional variations in lung volume and in the distribution of ventilation were measured with Xe¹³³ during normal gravity and during increased positive (+ g_z) acceleration on a human centrifuge. All subjects were studied at +1 g_z, three at +2 g_z, and one at +3 g_z. At +1 g_z the top of the lung was relatively more expanded than the bottom but the increment in volume (i.e.,

ventilation) is greater at the bottom than the top when inspiring above functional residual capacity. During increased acceleration these regional differences were magnified. In addition, the static pressure-volume curves were measured on each subject using different balloon depths during normal and increased acceleration. The shape of the static pressure-volume curve did not change significantly during increased acceleration. The probable cause of the regional differences in volume and ventilation which have been demonstrated is a gradient of static transpulmonary pressure down the lung. This gradient appears to be related to the weight of the lung, since it has been shown to be proportional to the magnitude of the acceleration. Extrapolation of the data to the 0 g condition indicates that in weightlessness the regional lung volumes and ventilation distribution should be uniform.

A66-81063

THEORETICAL ASPECTS OF OXYGEN TRANSFER DURING EARLY EXERCISE.

Robert Gübert, Gerhard H. Baule, and J. Howland Auchincloss, Jr. (N. Y. State U., Upstate Med. Center, Dept. of Med., Syracuse and Syracuse U., Dept. of Elec. Eng., N. Y.)
Journal of Applied Physiology, vol. 21, May 1966, p. 803-809. 19 refs.
 Grant PHS H-2800

A mathematical model consisting of a series of differential equations was designed to study oxygen transfer at the alveolar-capillary membrane during the transition from rest to steady-state exercise. Both continuous, constant ventilation at a fixed lung volume and breath-to-breath analysis with a fixed frequency were studied. The resulting curve of the time course of oxygen transfer was compared to the curve of oxygen transfer at the mouth. The alterations in the curves produced by changes in cardiac output, tissue metabolism, blood volume, and alterations in the breathing pattern are presented and discussed. The calculation of oxygen transfer at the alveolar-capillary membrane was shown to be relatively independent of the breathing pattern.

A66-81064

EFFECT OF VENTILATION ON OXYGEN TRANSFER DURING EARLY EXERCISE.

J. Howland Auchincloss, Jr., Robert Gübert, and Gerhard H. Baule (N. Y. State U., Upstate Med. Center, Dept. of Med., Syracuse and Syracuse U., Dept. of Elec. Eng., N. Y.)
Journal of Applied Physiology, vol. 21, May 1966, p. 810-818. 18 refs.
 Grant PHS H-2800.

A mathematical computation and analytical circuit were devised which permit the computation of oxygen transfer at the alveolar-capillary membrane (\dot{V}_D) on a breath-to-breath basis. Results with this circuit in five normal subjects gave 90% response times of .89-1.58 min. when subjects began to walk at 2.7 km/hr. on a 10% grade. These results were similar to measurements obtained with a similar circuit employing four different patterns of ventilatory increase with exercise. It is concluded that the way in which ventilation changes with exercise has little effect on \dot{V}_D . Another observation of the present study was the demonstration of configurations in the curve of \dot{V}_D versus time which were distinctive to individual subjects and were to some extent also independent of the way in which ventilation changed in relation to the onset of exercise.

A66-81065

PULMONARY ATELECTASIS IN SUBJECTS BREATHING OXYGEN AT SEA LEVEL OR AT SIMULATED ALTITUDE.

Arthur B. DuBois, Talvaris Turalds, Robert E. Mammen, and Fred T. Nobrega (U.S. Naval Air Eng. Center, Aerospace Crew Equipment Lab. and Pa. U., Div. of Graduate Med., Dept. of Physiol., Philadelphia).
Journal of Applied Physiology, vol. 21, May 1966, p. 828-836. 17 refs.
 NASA supported research.

Seven subjects were exposed to atmospheres of 100% oxygen at 5 p.s.i., 72 hr.; 7.5 p.s.i., 72 hr.; or 14.7 p.s.i. (sea level), 24 hr. Four of these developed a decrease of vital capacity, and of these four, two had plate-like atelectasis by X-ray. One of these was re-exposed to mixtures of oxygen with 30%, 5% or 2.5% N_2 at 5 p.s.i. The first two mixtures prevent the X-ray and vital capacity changes from occurring, whereas the third did not. In this subject there appeared to be air trapping as indicated by lateral displacement of the airway conductance-lung volume curve. It is concluded that absorptional atelectasis which occurred while breathing oxygen could be prevented in this subject by adding 5-30% N_2 to the oxygen.

A66-81066

EFFECT OF AGING ON RESPIRATORY MECHANICS AND GAS EXCHANGE IN RABBITS.

Joseph T. Davidson, Karlman Wasserman, Glen A. Lillingston, and R. William Schmidt (Stanford U., School of Med., Palo Alto Med. Res. Found. and Respirat. Function Lab., Palo Alto, Calif.)
Journal of Applied Physiology, vol. 21, May 1966, p. 837-842. 27 refs.
 Tuberc. and Health Assn., Calif. supported research.

Pulmonary function was studied in full-grown rabbits ranging in age from .5 to 5 years. Functional residual capacity as measured by the body plethys-

mographic method with the animal in the prone position was found to increase significantly with age. Static compliance and nonelastic resistance were determined using esophageal pressure as a measure of intrapleural pressure. Both these parameters were found to be increased in the old animal, signifying loss of elastic recoil and increased airway resistance. The studies indicate that the pulmonary function changes in the aging rabbit are qualitatively and quantitatively similar to those in the normal aging human subject. The changes are mild, producing no disturbance of gas exchange. These physiological studies do not corroborate the assertion that generalized pulmonary emphysema similar to that found in man occurs spontaneously in the majority of rabbits older than 2.5 years.

A66-81067

RESPIRATORY AND METABOLIC CHANGES DURING CARBON MONOXIDE POISONING.

J. N. Norman, T. A. Douglas, and G. Smith (Aberdeen U., Dept. of Surg. and Glasgow U., Dept. of Vet. Biochem., Scotland).
Journal of Applied Physiology, vol. 21, May 1966, p. 848-852. 23 refs.

Dogs were given a mixture of coal gas and air to breathe until the carboxyhemoglobin level reached 70%. Respiratory and acid-base measurements were made. Respiratory alkalosis occurred from hyperventilation, which was due to the development of metabolic acidosis. In the latter stage of gassing, when respiratory depression occurred, the PCO_2 returned to normal values. Respiratory acidosis was not detected even at the time of apnea, if this occurred.

A66-81068

PULMONARY CHANGES WITH CONVULSIONS INDUCED BY DRUGS AND OXYGEN AT HIGH PRESSURE.

John W. Bean, Dominic Zee, and Barbara Thom (Mich. U., Dept. of Physiol., Ann Arbor).
Journal of Applied Physiology, vol. 21, May 1966, p. 865-872. 36 refs.
 Grant NIH HE-01646.

In a study of the pulmonary involvement associated with epileptiform convulsions in rats it was found that convulsants, Metrazol, picrotoxin, W181, and PTAP induced pulmonary changes similar to those induced by O_2 at high pressure (OHP); anesthesia, which prevented convulsions, also prevented the pulmonary damage, whereas sympatholytic and antileptinephrine agents (SKF501, Thorazine, Diabenamine) prevented pulmonary damage but not the somatic component (skeletal muscular reaction) of severe chemically induced convulsions. Curarization which reportedly leaves the sympathetics still functional, prevented or greatly reduced the somatic component of the convulsion but did not prevent the pulmonary damage which thus apparently represents an effect of the autonomic component of the seizure. The data support the interpretation that pulmonary damage associated with severe generalized seizures induced by chemical convulsants as well as by OHP is due in large part to neuroendocrinogenic factors in the autonomic component of the seizure. The possibility of other contributory factors is not denied but hemodynamic changes which may attend the somatic component of the seizure are apparently not essential to the causation of this pulmonary damage.

A66-81069

RESPIRATORY HEAT EXCHANGE INFLUENCES ON DIENCEPHALIC TEMPERATURE IN THE CAT.

William S. Hunter and Thomas Adams (Okla. U., Dept. of Zool., Norman; and FAA, Civil Aeromed. Res. Inst., Physiol. Lab., Oklahoma City).
Journal of Applied Physiology, vol. 21, May 1966, p. 873-876. 11 refs.

Anterior hypothalamic temperature and intracranial thermal gradients were measured in anesthetized (chloralose-urethane), tracheotomized cats with intact upper respiratory pathways and when respired air was diverted from normal nasopharyngeal-buccal avenues. Additional experiments on intact, unanesthetized animals support the concept that the diencephalic-visceral temperature gradient is increased during both normal respiration and panting as a direct effect of convective and evaporative heat exchange from the upper respiratory surfaces. It is suggested that when the role of hypothalamic temperature is evaluated as a biothermal control system input, artifactual influences exerted by passive respiratory heat exchange mechanisms must be recognized.

A66-81070

HEMODYNAMIC RESPONSE TO TREADMILL EXERCISE IN NORMAL SUBJECTS.

Anthony N. Damato, James G. Galante, and William M. Smith (U.S. Public Health Serv. Hosp., Cardiopulmonary Lab., Staten Island, N. Y.)
Journal of Applied Physiology, vol. 21, May 1966, p. 959-966. 12 refs.
 Grant Natl. Heart Inst. HE05078.

Cardiac output, stroke volume, heart rate, arteriovenous (A-V) oxygen difference, and mean pulmonary artery pressure were determined in 24 normal male volunteer subjects using the direct Fick method. A change in body posture from supine rest to standing rest was accompanied by a fall in cardiac output and stroke volume and an increase in oxygen consumption,

heart rate, and A-V oxygen difference. No change in mean pulmonary artery pressure occurred. With initiation of mild treadmill exercise, stroke volume increased to supine resting values or slightly higher. Increasing the workload to submaximal levels resulted in further smaller increases in stroke volume, but heart rate was predominant in increasing cardiac output. Mean pulmonary artery pressures during treadmill exercise exceeded normal supine and standing resting values.

A66-81071

PARTITIONAL CALORIMETRIC STUDIES OF RESPONSES OF MAN TO THERMAL TRANSIENTS.

J. A. J. Stolwijk and J. D. Hardy (John B. Pierce Found. Lab., New Haven, Conn.)

Journal of Applied Physiology, vol. 21, May 1966, p. 967-977. 41 refs. Contract DA-49-193-MD-2373.

Men dressed in shorts were exposed for 1 hr. at 28° C., then quickly transferred to environments of 33, 38, 43, and 48° C. for 2 hr., and finally transferred to 28° C. for 1 hr. Continuous measurements were made of tympanic, rectal, and average skin temperatures, metabolic rate, and weight loss due to evaporation of sweat. Sweating responded to sudden changes in environmental temperature before appreciable changes occurred in either the tympanic or rectal temperatures. During the transient phases and steady states for environments of 33 and 38° C. the evaporative heat loss correlated best with the skin temperature. Stimulation of internal receptors alone, as indicated by the tympanic temperature, cannot account for the evaporative heat loss changes observed in these experiments. The total evaporative heat loss in these experiments could be considered as roughly the summative actions of the thermal stimulation of the skin and internal receptors with a relative weighting of 1:4.

A66-81072

CONTENT AND TURNOVER OF WATER IN BANTU MINERS ACCLIMATIZING TO HUMID HEAT.

W. V. Macfarlane, Beth Howard, J. F. Morrison, and C. H. Wyndham (Australian Natl. U., Canberra and Transvaal and Orange Free State Chamber of Mines, Appl. Sci. Labs., Johannesburg, South Africa).

Journal of Applied Physiology, vol. 21, May 1966, p. 978-984. 19 refs. Grant DA-MD-49-193-65-C141 and Transvaal and Orange Free State Chamber of Mines supported research.

Water content and turnover were determined with tritiated water in 10 Bantu from Angola, acclimatizing during 1 week to work at 86° F. and for the second week to 90° F. wet-bulb temperature in a deep Rand mine. Water content averaged 77% of body weight initially. This fell while average weight increased during exposure to heat. There was no general increase in water turnover among these tropical Bantu during acclimatization. Water turnover ranged from 73 to 162 ml/kg. per 24 hr. in the first week, 6.78 liters/24 hr. in the second week. Functional individuality of responses was apparent. Those subjects in whom body temperature was well controlled increased water turnover, while those with oral temperatures frequently above 101° F. during work, decreased turnover by 11%. Urinary sodium concentration was reduced relative to potassium during the first 3 days of exposure to each temperature.

A66-81073

BLOOD CHARACTERISTICS AND VOLUME IN TWO RODENTS NATIVE TO HIGH ALTITUDE.

Robert W. Bullard, Cyrus Broumand, and Frederick R. Meyer (Ind. U., Dept. of Anat. and Physiol., Bloomington).

Journal of Applied Physiology, vol. 21, May 1966, p. 994-998. 28 refs. Grants NSF GB11 and GM 1233-01.

Some characteristics associated with the blood of two rodents native to high altitude, *Citellus lateralis* and *Marmota flaviventris* at the Bancroft laboratory (altitude, 3,800 m.), were determined and compared to those of laboratory rats born and raised at 3,800 and 280 m. Both native rodents showed lower hemoglobin concentrations, erythrocyte counts, and hematocrit ratios than did the acclimatized rats. Hemoglobin content per cell was the same in the three species but the erythrocytes were slightly larger in the species native to high altitude. The volume of plasma and calculated volume of red blood cells on a body weight basis were larger in the marmots and squirrels, and these two species possessed hemoglobin dissociation curves far to the left of that of the acclimatized rats. The findings here agree with others—that many mammals native to high altitude do not possess polycythemia, and our results indicate that this is because of a higher plasma volume.

A66-81074

RELATIONSHIP OF THE HYPOXIC HEART RATE RESPONSE TO AMBIENT TEMPERATURE.

Robert W. Bullard and Frederick R. Meyer (Ind. U., Dept. of Anat. and Physiol., Bloomington).

Journal of Applied Physiology, vol. 21, May 1966, p. 999-1003. 9 refs. Contract DA 49-007-MD-947 and Grant NSF GB-11.

The heart rate responses to hypoxia in three species of small rodents, rat, ground squirrel, and hamster, were tested at different ambient temperatures. In a warm environment (35° C.) cardiac acceleration always occurred when the chamber containing the animal was ventilated with 10 or 5% oxygen, and at an ambient temperature of 10° C. cardiac slowing was the consistent event. In hypoxia at 23° C. the rat showed either slight slowing or acceleration. The reciprocal oxygen pulse, beats per milliliter O₂ consumed, was always greater with hypoxia. In the cold where shivering thermogenesis was blocked by hypoxia, a sharp decrease in metabolism may explain the cardiac slowing. At higher temperatures, where decreased metabolism did not occur during hypoxia, acceleration prevailed.

A66-81075

CHARACTERISTICS OF ECCRINE SWEAT GLAND ACTIVITY IN THE FOOTPAD OF THE CAT.

Thomas Adams (Civil Aeromed. Res. Inst., Aeron. Center, Physiol. Lab., Oklahoma City, Okla.)

Journal of Applied Physiology, vol. 21, May 1966, p. 1004-1012. 29 refs.

Sweat gland activity in the hind footpad of the cat, induced by electrical stimulation of the medial and lateral plantar nerves supplying the extremity, was measured directly as a function of skin evaporative water loss rates. These data indicate that the hydration density of the upper epidermis can vary as a function of sweat gland activity without the gross appearance of sweating as indicated by water droplets appearing on the skin surface. A mechanism is proposed wherein at low rates of sweat gland activity a micro-circulation of water exists through the upper epidermis, with water diffusing from the coiled distal sweat gland tubule laterally into the peritubular area in the stratum corneum to be resorbed at the base of the epidermis. The water storage capacity of the stratum corneum in connection with low level rates of sweat gland activity and the double innervation of sweat glands in the cat's footpad are also demonstrated.

A66-81076

EFFECT OF PROLONGED BED REST ON URINARY CALCIUM OUTPUT.

B. Issekutz, Jr., J. J. Blizard, N. C. Birkehead, and K. Rodahl (Lankenau Hosp., Div. of Res., Philadelphia, Pa.)

Journal of Applied Physiology, vol. 21, May 1966, p. 1013-1020. 29 refs. Contract AF 33(615)-1538.

The effect of prolonged supine position on the urinary nitrogen and calcium output was studied on young healthy men. Bed rest increased the excretion of calcium. The nitrogen output did not show any consistent response. Exercise on a bicycle ergometer in sitting or in supine position failed to change the course of calcium excretion. Supine exercise up to 4 hr./day did not decrease the urinary calcium output which was previously elevated by a complete bed rest. Quiet sitting for 8 hr. combined with 16 hr. lying did not prevent the rise of calcium output. On the other hand, 3 hr./day quiet standing proved to be sufficient to induce a slow decline of the elevated calcium excretion in four out of five subjects. Following a complete bed rest in the recovery phase when the subjects resumed their normal up-and-about activities, both the nitrogen and calcium excretion rapidly decreased below the base-line value of the individual. It is concluded that the increase in urinary calcium output in prolonged horizontal position is due to the absence of longitudinal pressure (weight bearing) on the bones rather than the physical inactivity during bed rest.

A66-81077

CHANGES IN THE COOL THRESHOLD ASSOCIATED WITH PHASES OF THE MENSTRUAL CYCLE.

D. R. Kenshalo (Fla. State U., Tallahassee).

Journal of Applied Physiology, vol. 21, May 1966, p. 1031-1039. 39 refs. NASA Grant NsG-148-61; Grants NSF GB-2473 and Fla. State U. Res. Council 036(33).

Cool thresholds and volume pulse amplitudes were measured after the skin was adapted to temperatures ranging from 30 to 40° C. during the menstrual cycles of three subjects. The cool threshold was significantly higher during the period from the onset of menses to ovulation than after ovulation. This change in the cool threshold occurred only when the skin had adapted to temperatures above 35° C. The cutaneous volume pulse amplitude was smaller during the preovulatory phase than during the postovulatory phase of the menstrual cycle when the skin was adapted to temperatures above 35° C. Evidence is presented that an increase in progesterone during the postovulatory phase of the cycle is responsible for the cutaneous vasodilation and the accompanying decrease in cool threshold.

A66-81078

METABOLIC ACIDOSIS OF EXERCISE IN HEALTHY MALES.

A. Bouhuys, J. Pool, R. A. Binkhorst, and P. van Leeuwen (Netherlands Inst. of Prevent. Med., Depts. of Occupational Med. and Statist. and U. Hosp., Lab. of Clin. Physiol., Leiden).

Journal of Applied Physiology, vol. 21, May 1966, p. 1040-1046. 24 refs. Am. Thoracic Soc. and Natl. Tuberc. Assn. supported research.

Lactic acid (LA), pH, standard bicarbonate (SB), and base excess (BE) in arterialized capillary blood, respiratory quotient (R) and "excess CO₂" were measured in submaximal and maximal work tests. Comparison of indices of exercise acidosis showed: (1) High values of R and of excess CO₂ were associated with high LA values, but the reverse was not always true. (2) A lesser degree of metabolic acidosis after maximum work in older subjects appeared from the LA, pH, SB, BE, and excess CO₂ data, but not from the R values. (3) A lesser degree of metabolic acidosis after a training period (four subjects) was shown by LA, pH, SB, and BE but not by R and excess CO₂. (4) Changes in SB in blood underestimate, while changes of BE in blood overestimate the amounts of acid added to blood during exercise. These discrepancies can be explained from the behavior of the buffer systems of blood and tissues. (5) Direct determination of LA in blood remains the most accurate and reliable index of the development of a metabolic acidosis during exercise.

A66-81079

SERUM GLUCOSE AND FREE FATTY ACIDS IN MAN DURING PROLONGED EXERCISE.

D. R. Young, R. Pelligra, and R. R. Adachi (NASA, Ames Res. Center, Biotechnol. Div., Moffett Field, Calif.)

Journal of Applied Physiology, vol. 21, May 1966, p. 1047-1052. 30 refs.

Studies were conducted to study postabsorptive energy metabolism under two levels of physical activity, resting or treadmill walking, for periods of up to 24 hr. duration. During resting conditions, the serum glucose at first declined and then stabilized at a level of 73 mg./100 ml. The level of serum free fatty acids (FFA) reached a steady-state level of 1.1 meq./liter. Similar trends occurred during treadmill walking, but they differed in magnitude. During work, the level of serum glucose declined to 66 mg./100 ml. and thereafter remained constant; serum FFA reached a constant level of 2.4 meq./liter. The RQ (respiratory quotient), serum lactate, serum nonprotein nitrogen, and urinary nitrogen were similar during both test conditions. Under the conditions of the experiment a constant rate of influx and extraction of glucose as well as FFA from the blood was attained.

A66-81080

Ca AND Mg LEVELS IN GASTROINTESTINAL MUCOSA OF FED, FASTED, AND LACTOSE-TREATED RATS.

C. Silber Marcus and R. H. Wasserman (Cornell U., N. Y. State Vet. Coll., Dept. of Phys. Biol., Ithaca).

Journal of Applied Physiology, vol. 21, May 1966, p. 1063-1067. 10 refs. Contract AEC AT (30-1)-2147; Grants NIH AM-04652 and Natl. Inst. of Dental Res. DE-90 and STI-DE-90.

Several in vivo characteristics of the cells of the rat gastrointestinal mucosa, and venous plasma, were explored under conditions of normal feeding, fasting, and fasting plus lactose ingestion. The cells of the intestinal mucosa did not significantly swell, shrink, or change their water percentage during these three nutritional situations. In addition, fasting somewhat decreased the level of calcium below that which was seen in normally fed rats, while lactose decreased it even more. Whatever the general level of calcium in the intestinal mucosa, the concentrations were higher in the distal parts of the small intestine than in the proximal parts. Fasted and lactose-dosed rats showed an increase in mucosal magnesium over that found in fed rats. Whatever the general mucosal level of magnesium in the gut, the concentrations remained relatively constant from proximal to distal parts. Lactose decreased the plasma calcium and magnesium concentrations below that found in fed or fasted rats.

A66-81081

PHYSIOLOGICAL RESPONSES AND ENERGY EXPENDITURES, OF WOMEN USING STAIRS OF THREE DESIGNS.

Martha Richardson (U.S. Dept. of Agr., Agr. Res. Serv., Clothing and Housing Res. Div., Washington, D. C.)

Journal of Applied Physiology, vol. 21, May 1966, p. 1078-1082. 19 refs.

To determine the effect of differences in architectural designs for stairways on the energy expenditure, heart rate, and other cardiovascular responses of women when using stairs, three different combinations of riser heights and tread widths were tested by using an adjustable staircase treadmill especially developed for this purpose. Energy expenditures of eight women were significantly different for using stairs of three designs, with a mean cost of 7.8, 13.3, and 15.3 (mean, 12.1) for ascending; and 5.3, 7.4, and 8.4 (mean, 7.1) cal./kg.-m. vertical distance for gentle, intermediate, and steep (27°, 38°, and 40°) slopes, respectively. Pulse rate and systolic blood pressure also varied significantly with stair design, with these responses ranking the designs in the same order as did energy expenditure.

A66-81082

A SIMPLE AND INEXPENSIVE HIGH ALTITUDE CHAMBER FOR SMALL ANIMALS.

F. H. Kahn, D. H. Simmons, and L. B. Guze (Calif. U., Med. Center, Depts. of Med. and Physiol., Cedars-Sinai Med. Center, Med. Res. Inst., and Veterans Admin. Center, Los Angeles).

Journal of Applied Physiology, vol. 21, May 1966, p. 1085-1086.

With an increasing interest in the physiological effects of high altitude, there is a need for a dependable and inexpensive high-altitude chamber. Construction of a chamber with a vacuum pump to maintain a low atmospheric pressure for short periods presents no special problem, but a satisfactory high-altitude chamber must provide for continuous operation and for continuous maintenance of other environmental factors such as an oxygen supply, humidity, ambient CO₂ concentration, normal temperature, etc. over long periods of time. In addition, such a chamber must provide a convenient means of handling and feeding the animal within the chamber, as well as safety devices to protect the animal in the event of failure of the evacuation pump. Control of these factors has resulted in fairly expensive and elaborate designs of high-altitude chambers previously described. This article describes a simple chamber costing under one thousand dollars which was found to be free of major mechanical problems. The chamber has been in use for 18 months and meets the described criteria for maintenance of a constant environment. This chamber may be operated at pressures down to well below 1/3 atm., the equivalent of 25,000 ft. elevation.

A66-81083

PULMONARY FUNCTION TESTING IN THE RABBIT.

Joseph T. Davidson, Karlman Wasserman, Glen A. Lillingston, and R. William Schmidt (Stanford U., School of Med., Palo Alto Med. Res. Found. and Respirot. Function Lab., Palo Alto, Calif.)

Journal of Applied Physiology, vol. 21, May 1966, p. 1094-1098. 27 refs. Tuberc. and Health Assn., Calif. supported research.

This communication reports on the practicability of pulmonary function testing in the rabbit. The methodology made use of techniques developed for human studies. It involved general anesthesia and endotracheal intubation with a cuffed tube to provide a leakproof airway. This permitted serial testing at weekly intervals of ventilation, functional residual capacity, pulmonary compliance, and nonelastic resistance. In addition, a superficial, easily accessible ear artery facilitated the collection of arterial blood for study of gas tensions in the unanesthetized animal. All these tests were well tolerated. It is concluded that the rabbit is an eminently suitable subject for functional respiratory studies in mammalian experimental physiology.

A66-81084

SPINAL COLUMN AND FITNESS TO FLY IN MILITARY PILOTS

[WIRBELSÄULE UND WEHRFLIEGERVERWENDUNGSFÄHIGKEIT].

J. Böger and H. W. Kirchhoff (Flugmed. Inst. der Luftwaffe, Fürstenfeldbruck, West Germany).

Wehrmedizin, vol. 3, Oct. 1965, p. 143-174. 55 refs. In German.

The strains imposed by jet flight on the vertebral column of the pilot are described and related to injuries frequently observed in flying personnel. Clinical examination, functional tests, and X-rays of the spinal column are discussed in detail. Pathological findings and prognosis of changes of the spinal column are evaluated differentially in selection of pilot candidates and in flight fitness examinations. Recommendations are made for therapy in form of drugs and exercise and for aeromedical supervision of flying personnel with injuries or disorders of the spinal column.

A66-81085

STATE OF THE ART OF CHEMICAL RADIATION PROTECTION [ZUM DERZEITIGEN STAND EINES CHEMISCHEN STRAHLENSCHUTZES].

R. Koch (Freiburg/Brsg. U., Radiol. Inst., West Germany).

Katastrophenmedizin (Suppl. to *Wehrmedizin*, vol. 3, Oct. 1965), p. 3-7. 43 refs. In German.

A brief summary is given of the history of research in radioprotection. Sex differences in radiosensitivity led to the discovery of the radioprotective effect of estrogen and related compounds. Radioprotective drugs such as cysteine and cysteamine are limited in their application since they have to be administered parenterally 5-15 min. before exposure. Poor storage qualities also bar practical use. More progress was achieved with the discovery of β -aminoethylisothiourea bromide (AET) and hemocysteinethiolactone (HCT) which release the effective SH-groups only within the organism, are not easily oxidized, may be administered orally, and are effective over a longer period of time. HCT dimerizes when stored. AET has been shown to be effective in larger mammals and primates, therefore it is probably effective in man. However, it has severe side effects in radioprotective doses. Discrepant results are encountered in small mammals with low radiation dose and whole body exposure. Histamine, cysteine, and cysteamine are effective in combination injuries, i.e., radiation exposure with burns or mechanical trauma. Other radioprotective drugs of promise include reserpine, probably via release of serotonin, pyridoxal-5-phosphate, and xanthine derivatives.

A66-81086

ILLUSIONS IN FLIGHT: A LITERATURE SURVEY ON PROBLEMS OF PILOTING [ILLUSIONEN IM FLUGE: EINE LITERATURSTUDIE ZUR PROBLEMATIK DER FLUGZEUGFUHRUNG].

1.4 ehwiss-Litzmann (Med. Dienst des Verkehrswesens, East Berlin, Germany). *Verkehrsmedizin und ihre Grenzgebiete*, vol. 12, Nov. 1965, p. 577-590. 39 refs. In German.

This is a review of common sensory illusions in flight, i.e., autokinesis, disorientation with respect to distance and altitude, negative aftereffect, oculogravic illusion, coriolis effect, "jamais vu", "déjà vu", etc. Role of physiological processes and environmental factors is discussed. Prophylactic measures recommended are: absolute concentration and reliance upon instruments; highly developed flight habits and skills; good training in instrument flight; a timely switchover to instrument flight in clouds; anticipation of unusual conditions with full knowledge of common illusion; emotional stability; normal sensibility of the vestibular apparatus with special training; sufficient training after a break in flying; normal schedule with respect to sleep, rest, vacation, alcohol, and nicotine; prevention of respiratory infections since these increase vestibular sensitivity.

A66-81087

ISOMETRIC TRAINING EFFECTS UPON CENTRAL FACILITATION. Walter Kroll (Tex. U., Austin).

Research Quarterly, vol. 36, Dec. 1965, p. 427-432. 14 refs. Grant NIH NB-05305-01.

Two matched groups of 10 subjects each were employed to assess possible central facilitation effects over four weeks of training. Each of the 12 training sessions consisted of 20 trials of maximum isometric wrist flexion for five seconds with a 30-second rest period between trials. Two experimental conditions were used on alternate sessions: (1) 20 trials, of which odd-numbered trials were unilateral and even-numbered trials were bilateral efforts; (2) the first 15 trials were unilateral and the last 5 trials were simultaneous bilateral efforts. The right limb in Group I and the left limb in Group II constituted the criterion measures. Central facilitation effects due to simultaneous bilateral isometric wrist contractions were: (a) not present initially, and (b) not elicited through the four weeks of training. The finding held for both dominant and nondominant limbs and for fatigued and non-fatigued states.

A66-81088

CRITERION MEASURES FOR EXTREMELY ISOLATED GROUPS.

E. K. Eric Gunderson and Paul D. Nelson (U.S. Navy Med. Neuropsychiat. Res. Unit, San Diego, Calif.).

Personnel Psychology, vol. 19, Spring 1966, p. 67-80. 6 refs. Navy Dept. supported research.

This is a summary of the development of individual performance measures in an unusual and extreme environment, namely that of small scientific stations in Antarctica. The measures investigated were supervisors' and peers' evaluations. The first study of the first two years of Antarctic stations showed: (1) significant agreement among station leaders', supervisors', and peers' evaluation, (2) significant positive intercorrelations among evaluations of work and social adjustment and overall effectiveness, and (3) significant correlations between emotional difficulties as measured by a symptom questionnaire and measures of group members' work and social effectiveness. In the second series over a three year period assessment techniques were changed slightly. Supervisor and peer evaluations consisted of (a) independent ratings of all members by the two station leaders or nominations by peers on a series of trait scales and (b) independent rankings of all station members in the order in which they would be selected to serve again in the Antarctic. The last item was found to be more meaningful. Ranking was more satisfactory. In the next phase supervisors rated all personnel on 21 behavior traits. Three trait clusters emerged through factor analysis. Emotional stability, task motivation, and social compatibility accounted for the greatest amount of criterion variance. The results are discussed with respect to methodology, validity, and applicability to selection for service in similarly unusual and extreme environments.

A66-81089

CONTEXT EFFECTS IN PROBABILITY LEARNING AND DECISION-MAKING.

Lowell M. Schipper (Pa. State U., University Park).

Psychological Reports, vol. 18, Feb. 1966, p. 131-138. 5 refs. Pa. State U. and Boeing Co. of Seattle, Wash. supported research.

Separate groups of subjects were trained in multiple probability-learning situations where sets of probabilities were (a) .10, .20, .30, .40, .50, (b) .50, .60, .70, .80, .90, and (c) .10, .30, .50, .70, .90, respectively. Subsequent to the training session subjects received test trials on all combinations of the five probabilities. Differential training with equal probabilities in different contexts gave different learning curves. Subjects' uses of these probabilities in the test situations also varied as a function of prior training.

A66-81090

APPLYING ELECTRONIC TECHNIQUES TO STUDY THE PHYSIOLOGY OF EXERCISE UNDER DYNAMIC CONDITIONS.

J. M. M. Neilson and C. T. M. Davies (Edinburgh U., Depts. of Med. Phys. and Physiol., Great Britain).

World Medical Electronics, vol. 4, Feb. 1966, p. 38-42.

Several electronic devices are described for recording physiological functions of a subject performing physical exercise such as: pulse rate, electrocardiogram, electromyogram, and respiratory volume. All responses are translated into electrical form, which makes it possible to process data with a greater speed and accuracy.

A66-81091

DISTRIBUTION OF FATS IN THE ADRENAL GLAND OF RATS DURING REPEATED STRESS (ÜBER DIE VERTEILUNG VON FETTEN IN DER NEBENNIERE VON RATTEN IM LAUFE WIEDERHOLTER STRESSEINWIRKUNG).

A. Mitro and L. Mikulaj (Slovak Acad. of Sci., Endocrinol. Inst., Bratislava, Czechoslovakia).

Endokrinologie, vol. 49, Dec. 1965, p. 18-21. 6 refs. In German.

Rats were immobilized daily for 2 1/2 hours over a 35-day period. Lipid content of the adrenal cortex was studied in experimental animals decapitated after 7, 14, 21, 28, and 35 days of immobilization and compared with controls. Zona glomerulosa showed essentially no change. In zona fasciculata and zona reticularis there was an initial disappearance of the lipid content followed by gradual restitution of the morphological picture; lipid droplets reappeared in cells in spite of continued daily stress. Progressive inhibition of the adrenocorticotrophic function of the central nervous regulatory centers is thought to be involved.

A66-81092

EFFECT OF ULTRASOUNDS ON THE METABOLISM OF IODINE IN GUINEA-PIGS (WPLYW ULTRADZWIEKOW NA PRZEMIANE JODU U SWINEK MORSKICH).

Piotr Sjawinski.

Annales Academiæ Medicæ Stetinensis, vol. 11, 1965, p. 259-282. 50 refs. In Polish.

Guinea-pigs were exposed 1-30 times to ultrasound of 800 kHz frequency, and 0.5-1 W/cm² intensity. The exposures were of 10 minutes duration. Ten μ C ¹³¹I was applied for evaluating the thyroid function. Ability to accumulate iodine in the thyroid, iodine concentration in blood, as well as the concentration of PBI¹³¹ (Protein-Bound Iodine-131) were determined. Radiochromatograph and autoradiographic determinations of thyroid hormones concentration were performed. Radioactivity of the urine excreted within 24 hours following the subcutaneous injection of the radioactive iodine was measured. Depending on the dose applied, the ultrasound gave rise to stimulation or weakening of the thyroid function. Under the influence of a short ultra-acoustic stimulus, an increase was seen in the thyroid function, which was proved by the elevated iodine accumulation in the gland, the increased concentration of iodine compounds in the blood, and also by the decreased excretion in urine. Prolonged ultrasonic action led to the weakening of thyroid function, which was proportional to the doses used. In animals with a marked thyroid hypofunction the weakening of DIT (diiodothyronine) and diiodothyronine synthesis was noted.

A66-81093

ELECTROCARDIOGRAPHIC PATTERN IN RABBITS IN DEEP HYPOTHERMIA WITH SPECIAL CONSIDERATION TO EXTINCTIVE CURRENTS (OBRAZ ELEKTROKARDIOGRAFICZNY U KROLIKOW W GLEBOKIEJ HIPOTERMII ZE SZCZEGOLNYM UWZGLEDNIENIEM PRADOW WYGASAJACYCH).

Ryszard Christman.

Annales Academiæ Medicæ Stetinensis, vol. 11, 1965, p. 411-428. 83 refs. In Polish.

In rabbits under deep hypothermia the clinical death was preceded by an increased sinus slowing of the heart function, the extension of the excitability conduction time, the appearance of ectopic rhythm, premature beats, and deformation of the ventricle complexes. Following death, the degree of excitability decreased, with various rhythm disturbances, changes in the form and amplitude of the ventricle complexes, frequently with characteristic fusion of T waves and widened QRS complex. The last electrically active segments of the heart were most frequently the tertiary, rarely secondary centers or the sinus node. Cold, as a factor leading to death, led to extinction of the electrical heart function. The author compared the electrocardiograms of the rabbits perishing in deep hypothermia with those of dying people and established the similarities and differences. The similarities are constituted by the duration of the extinction time, progressive inhibitory symptoms in the excitability-conduction system, changes in the shape of ventricle complexes and also the excitability-originating centers forming ultimum moriens. The differences, on the other hand, show in animals a considerable preponderance of inhibitory processes over those of excitability, while in human beings the processes of both the inhibition and excitability appear at equal rate. Whereas there is no increase in ECG (electrocardiogram) changes at the time when the clinical death of the rabbit occurs, there is, however, a striking rise of these changes at the death of human beings.

A66-81094

THE EFFECT OF THERMAL STRESS ON THYROIDAL ^{131}I UPTAKE AT DIFFERENT LEVEL OF THYROID FUNCTION.

J. Fihorn, J. Tenner, and E. Oborska-Jadwiszczak (Silesian Med. Acad. in Pytom, Inst. of Oncol., IIrd Dept. of Internal Diseases, Gliwice, Poland). *Polish Endocrinology*, vol. 14, no. 5-6, 1963, p. 284-290. 21 refs.

Thyroid activity under thermal stress was investigated by means of ^{131}I uptake in hypo-, eu-, and hyper-thyroid subjects. The assumption that thermal stress increases thyroid activity was not confirmed. There was no increased ^{131}I uptake by the thyroid gland during heating in subjects with thyroid disturbances, but thyroid uptake in heated euthyroid individuals increased slightly up to the last count, 24 hours after radiolodine administration. Hyper-thyroid subjects exhibited increased ^{131}I uptake before heating, possibly due to emotional response.

A66-81095

ON THE RELATIONSHIPS BETWEEN CIRCULATORY VALUES AT REST AND PHYSICAL FITNESS (ÜBER BEZIEHUNGEN ZWISCHEN RUHE-KREISLAUFWERTEN UND KÖRPERLICHER LEISTUNGSFÄHIGKEIT).

H. P. Millahn (Rostock U., Physiol. Inst., East Germany). *Internationale Zeitschrift für angewandte Physiologie*, vol. 21, no. 3, 1965, p. 179-189. 24 refs. In German.

Circulatory system analyses were carried out according to the method of Broemser and Ranke (1930) in 50 athletes and 39 nonathletes. Physical fitness of the subjects was determined by means of physical work capacity at a pulse rate of 170 beats/min. (PWC₁₇₀) and of maximal oxygen consumption according to the Astrand-Ryhmung nomogram (1954). Significant correlations were obtained between body weight and heart rate, heart minute volume, heart minute volume per kg. body weight, cardiac function, vascular resistance, and diastolic time on one hand and PWC₁₇₀ and maximal oxygen consumption on the other. The closest correlation, with an $r = -0.76$, was found between the minute volume per kg. body weight at rest and the PWC₁₇₀. Therefore, minute volume per kg. body weight may be used to assess physical capacity. A low ratio is associated with a high physical capacity and a high ratio with low physical capacity. This relation between the circulatory values at rest and physical fitness is based on the circulatory economy of the particular phase of training.

A66-81096

THE EFFECTS OF TERMINATING AND DETRAINING ON ENZYME ACTIVITIES OF HEART AND SKELETAL MUSCLE OF TRAINED RATS.

George R. Hearn (Ithaca Coll., School of Health and Phys. Educ., N. Y.). *Internationale Zeitschrift für angewandte Physiologie*, vol. 21, no. 3, 1965, p. 190-194. 14 refs.

Thirty-six male Sprague-Dawley rats with an average weight of 360 g. were trained with an exercise program by swimming 35 min. a day in water at 35°C. After five weeks of training one of the trained groups terminated the exercise program, while the remaining experimental group of animals detrained by swimming a minute less each day for 5 weeks following the training. Control-fed non-swimming animals served as controls. The group of animals that terminated the training program gained weight at a rate which was about 60% greater than the controls. The detrained group of animals had adrenals that were significantly heavier than the controls, while their kidney weights were significantly lighter. The termination of training changed significantly the succinate-cytochrome c reductase activities of the skeletal muscle, while the cytochrome oxidase activities and the unit activity of succinate-cytochrome c reductase of the heart ventricles were significantly altered for the detrained group. Aldolase revealed no significant enzymatic changes in either heart or skeletal muscle for either of the experimental groups.

A66-81097

THE PREDICTION OF CARDIO-RESPIRATORY FITNESS.

R. J. Shephard and R. Lyn McClure (Toronto U., School of Hyg., Dept. of Physiol. Hyg. and Connaught Med. Res. Labs., Canada). *Internationale Zeitschrift für angewandte Physiologie*, vol. 21, no. 3, 1965, p. 212-223. 21 refs.

Dept. of Natl. Health and Welfare, Canada supported research.

Sixty young male subjects were exercised on a bicycle ergometer at a constant load of 140 Watts three times daily for five days. The relationship between an assessment of the exercise taken by each subject ('fitness' grading) and 26 measurements of pulse rate, ventilation, personality, and other variables was investigated by a series of multiple regression analyses. The optimum regression equation incorporated three negative coefficients (the pulse rate 15 min. after exercise on Day 1, the change in end-exercise pulse rate from Day 1 to Day 4, and the extraveilation of exercise on Day 1) and three positive coefficients ('resting' ventilation, extraveilation during the first minute of exercise, and the change in pulse rate 15 min. after exercise from Day 1 to Day 4). The optimum equation accounted for 50% of the variance of the 'fitness' grading. A prediction of maximal oxygen consumption by the Astrand nomogram (1956) accounted for only 35%. Certain practical objections to the Astrand nomogram are pointed out. The physiological significance of the regression coefficients is discussed.

A66-81098

MEASUREMENT SCHEDULE EFFECTS UPON ISOMETRIC ENDURANCE.

Walter Kroll (Tex. U., Phys. Educ. Res. Lab., Austin). *Internationale Zeitschrift für angewandte Physiologie*, vol. 21, no. 3, 1965, p. 224-229. 13 refs.

Twenty male subjects were given 20 isometric wrist flexion trials on each limb. Two weeks later the measurement schedule was repeated on the left wrist and the right wrist. Each trial was a five-second maximum exertion followed by a 30-second rest period. Compared to the first test session, the retest session two weeks later showed an improvement in absolute strength of 8.7 and 6.0% for right and left wrists, respectively. A mean improvement in strength over all trials of 14.1 and 11.9% resulted for right and left wrists, respectively, as well.

A66-81099

ENERGY BALANCE VALUES IN PHYSICALLY INACTIVE PERSONS LIVING ON PREDOMINANTLY DEHYDRATED FOOD (ENERGIEBILANZEN VON PERSONEN OHNE KÖRPERLICHE BETÄTIGUNG BEI VORWIE- GENDER KOMPRIMATVERPFLEGUNG).

W. Wirths (Max Planck-Inst. für Ernährungsphysiol., Dortmund, West Germany). *Internationale Zeitschrift für angewandte Physiologie*, vol. 21, no. 3, 1965, p. 230-246. 7 refs. In German.

Forty-one female and 39 male subjects in isolation received for three days a conventional diet of 1850 kcal. (81 g. protein with 26 g. of it of animal origin, 70 g. pure fat, 230 g. carbohydrates) each per day. The next 10 days, their rations were for the most part in the form of concentrated, dehydrated food pellets. Last 5 days, dehydrated food was supplemented by conventional items. Daily mineral content of the ration was: 675 mg. Ca, 1110 mg. P, 13.7 mg. Fe, 5.95 g. NaCl, 735 μg . vitamin A, 1.1 mg. thiamine, 2.3 mg. riboflavin, 9.2 mg. niacin, 285 mg. vitamin C. Percent composition was 13.5% protein, 35.2% fat, 51.3% carbohydrate. Forty-two percent of protein was of animal origin. Fluid intake was 21. daily. Daily average intake by males was 1615 kcal.; by females 1545 kcal. Measurements are presented of body weight, blood pressure, and nutritional condition estimated from measures of skinfold and abdominal, upper arm, and calf circumference of the subjects. In male subjects there was a caloric deficit between energy demand and energy supply, while in the females because of the lower basal metabolism there was only a discrepancy between energy demand and actual intake, but not the supply available.

A66-81100

ON THE MOVEMENTS OF THE HUMAN PUPIL AFTER A SUDDEN CHANGE OF THE INTENSITY OF LIGHT STIMULUS (ÜBER DIE BEWEGUNGEN DER MENSCHLICHEN PUPILLE NACH EINER SPRUNGGARTIGEN ÄNDERUNG DER REIZLICHTINTENSITÄT).

Joachim Hornung (Max Planck-Inst. für Arbeitsphysiol., Dortmund, West Germany). *Pflügers Archiv für die gesamte Physiologie*, vol. 287, no. 1, 1966, p. 29-40. 16 refs. In German.

The left eye of the subject was exposed to a global light-stimulus, the luminance of which was suddenly changed once in each experiment. The consensual pupil reflex was recorded in the right eye. With the light increasing from dark to bright, pupil movements after the primary contraction were as follows: (1) with the light changed from dark to less than 220 lux on the cornea, a redilatation with a time constant of 0.5 min. was observed; (2) with changes to values between 220 and 1300 lux, the pupil size was almost constant; (3) with changes to more than 1300 lux, a subsequent contraction with a time constant of 2 min. took place. The redilatation was also found with the pupil having been dilated artificially and with a red light-stimulus without scotopic effect. Retinal processes of light adaptation are supposed to be the cause of the redilatation. The cause of the subsequent contraction is unknown. Both causes seem to work simultaneously. With the light-stimulus changed from bright to dark, slow adaptation processes also occur, as indicated by the pupil movements.

A66-81101

PROGRESSIVE HYPOXIA THROUGH REBREATHING OF THE EXPIRED AIR WITH SIMULTANEOUS CO₂ ABSORPTION (Fortschreitende Hypoxie durch Ruckatmung der Expirationsluft bei gleichzeitiger CO₂-Absorption).

K. Redmann and W. Kalkoff (Med. Akad. Magdeburg, Physiol. Inst., Leipzig, East Germany). *Pflügers Archiv für die gesamte Physiologie*, vol. 287, no. 1, 1966, p. 81-88. 8 refs. In German.

This is a quantitative study of a rebreathing system. Relationships between duration, initial volume, oxygen pressure, metabolic level, and drop in oxygen tension are described by formulas. Diagrams 2 and 3 permit a rapid calculation of all values in the system and simplify clinical application. Rebreathing experiments on dogs and humans confirmed the validity of these theoretical calculations of the hypoxic process in the rebreathing system.

A66-81102

THE URINARY EXCRETION OF PORPHYRINS AND THEIR PRECURSORS IN SUBJECTS EXPOSED TO CHRONIC ABSORPTION OF LEAD AND ITS COMPOUNDS.

H. Kozłowska-Ipska and O. Gutniakowa (Med. Acad., Dept. I of Internal Diseases and Inst. of Nucl. Res., Dept. of Health Protec., Warsaw, Poland). *Polish Medical Journal*, vol. 4, no. 5, 1965, p. 1048-1058. 25 refs.

Urinary alpha-aminolevulinic acid (ALA), porphobilinogen (PBG), coproporphyrin (Copro), and uroporphyrin (Uro) were quantitatively determined in 41 subjects exposed to lead and its compounds. Group 1, subjects exposed to the absorption of tetraethyl lead, presented an increased level of lead in the blood, a normal urinary concentration of ALA, a normal pattern of peripheral blood, and signs of nervous system lesions. Groups 2-4, subjects exposed to the absorption of inorganic lead compounds, showed an increase in certain haem precursors in the urine. The increase in urinary ALA was usually associated with a rise in Copro level. These subjects had normal or slightly elevated urinary PBG level. Clinical observations suggested a certain correlation between the elevated ALA excretion and the changes in the gastro-intestinal track and the peripheral blood counts. No correlation was found between urinary ALA output and the nervous symptoms. In none of the 41 subjects was Uro found in the urine. Treatment with the calcium-diiodium salt of ethylenediaminetetraacetic acid decreased to normal levels the urinary excretion of ALA as determined four days after the end of the treatment.

A66-81103

ELECTROCARDIOGRAPHIC CHANGES IN PATIENTS WITH LEAD POISONING.

A. Krotkiewski, J. Juskowa, and H. Kozłowska (Med. Acad., Dept. I of Internal Diseases, Warsaw, Poland).

Polish Medical Journal, vol. 4, no. 5, 1965, p. 1059-1064. 13 refs.

Electrocardiograms of 300 patients with lead poisoning are compared with 291 electrocardiograms of control subjects with no exposure to lead. No electrocardiogram change was found in 255 (87.62%) of the control subjects. In the patients with lead poisoning, no electrocardiogram change was seen in 204 subjects (68%). It is concluded that lead does not directly damage the heart. The statistically significant prevalence of abnormal electrocardiograms in patients with lead poisoning was probably related to atherosclerosis since it was noted only in subjects above 46 years of age. It is possible that lead accelerates the development of atherosclerosis.

A66-81104

THE EFFECT OF OXYGEN SATURATION AND PH OF THE BLOOD ON THE CARBOHYDRATE METABOLISM OF ERYTHROCYTES.

W. Orlikowska, W. Serzysko, Z. Kwiatkowska, E. Malinowski, and H. Rogala (Med. Acad., Dept. III of Internal Diseases, Warsaw, Poland).

Polish Medical Journal, vol. 4, no. 5, 1965, p. 1093-1101. 18 refs.

The *in vivo* effect of increased oxygen saturation and lowered pH of the blood suppressing the glycolysis of mature human erythrocytes was studied. Glycolysis was estimated indirectly, through determination of the phosphorus (adenosine triphosphate) content of erythrocytes. Blood samples for study (venous blood, ordinary arterial blood, and arterial blood after breathing oxygen) were obtained from patients with cor pulmonale and heart failure and compared with those of healthy subjects. The suppressing effect of oxygen on the glycolysis of erythrocytes (the *in vivo* effect of Pasteur) was confirmed. No direct inhibiting effect of lowering blood pH on erythrocyte glycolysis was demonstrated, for *in vivo* a change in oxygen saturation of the blood is associated with a change in blood pH. In one case of severe respiratory and circulatory failure, the results suggest the existence of such an effect.

A66-81105

COMPARATIVE STUDIES WITH THE INDIRECT CAMPBELL AND HOWELL METHOD AND THE DIRECT RILEY METHOD OF DETERMINING PARTIAL CARBON DIOXIDE TENSION IN THE BLOOD.

W. Droszcz (St. David's Hosp., Asthma and Allergy Res. Unit, Cardiff, Wales, Great Britain and Med. Acad., Dept. I of Internal Diseases, Warsaw, Poland). *Polish Medical Journal*, vol. 4, no. 5, 1965, p. 1131-1135. 9 refs.

The partial carbon dioxide tension in arterial blood was determined in 21 normal subjects and 35 patients with bronchial asthma and chronic bronchitis using the indirect method of Campbell and Howell and employing the 20-sec. phase II. Mean arterial CO₂ tension in normal subjects was 40.8 ± 2.2 mm. Hg. In 31 patients the results obtained with this method were compared with those yielded by the method of Riley. Arterial blood for study was drawn in the II phase of Campbell and Howell's test. For the whole material studied the correlation coefficient "r" for the two methods was +0.87 (chronic bronchitis) and +0.89 (bronchial asthma). An excluded group of patients whose partial CO₂ tension of arterial blood was in excess of 60 mm. Hg. according to Riley method, showed a considerably lower coefficient of correlation with the method of Campbell and Howell (-0.75). Campbell and Howell test may be recommended for use in a clinic, but in patients suspected of great increase of PCO₂ in the blood, the phase II should be prolonged to 40 sec.

A66-81106

EXTRATERRESTRIAL BIOLOGY.

Richard S. Young (NASA, Ames Res. Center, Exobiol. Div., Moffett Field, Calif.). New York, Holt, Rinehart and Winston, Inc., 1966, 119 p. 9 refs. \$2.95.

This book is an introduction to several facets of extraterrestrial detection and forms of life to be expected. The properties of terrestrial life are discussed in terms of cellular components, metabolism, motility, response to stimuli, adaptation, heredity, and possible origin. The physical conditions on other planets are examined briefly and the necessity is stressed of sterilizing spacecraft for planetary landings. The scientific and engineering problems of landing a functional payload on Mars are foreseen, and several life-detection techniques and specific machines (Wolf Trap, Gulliver, and Multivator) are described and illustrated. Several biological experiments which have been successfully performed in spacecraft are reviewed.

A66-81107

METEORITES AND PROBLEM OF EXISTENCE OF OUTER SPACE LIFE [METEORITY I PROBLEMA SUSHCHESTVOVANIYA VNEZEMNOI ZHIZNI].

A. A. Imshenetski.

Vestnik Akademii Nauk SSSR, vol. 36, no. 1, Jan. 1966, p. 36-45. In Russian.

The results of studies of the known carbonaceous chondrites are summarized. The possibility of the extraterrestrial biogenic origin of the inclusions present in them is indicated. The modern analytical methods make it possible to determine that these inclusions resemble in their chemical composition the terrestrial compounds formed by biosynthesis. They also contain some radical groups which may be of extraterrestrial origin. Microscopic studies of thin sections revealed the presence of minute bodies, which in form and staining characteristics resemble some terrestrial microorganisms. Although it is possible that living cells could survive the extreme high temperature generated by friction during passage through the earth's atmosphere, the porosity of the compound could also admit minute terrestrial microorganisms once they are deposited on the earth's surface. The experiments conducted by some Soviet scientists showed definitely that the presence of moisture in the environment can facilitate the penetration of microorganisms through the dense layers of practically all samples of the known types of meteorites.

A66-81108

MAN IN SPACE (SOME RESULTS OF THE SYMPOSIUM ON PROBLEMS OF MAN'S LIFE IN SPACE) [CHELOVEK V KOSMOSE (NEKOTORYE ITOGI SIMPOZIUMA PO VOPROSAM ZHIZNI CHELOVEKA V KOSMICHESKOM PROSTRANSTVE)].

A. M. Gentin, and V. N. Chernigovskii.

Vestnik Akademii Nauk SSSR, vol. 36, no. 1, Jan. 1966, p. 46-50. In Russian.

A short symposium of "Man in Space", which took place in Paris, June 14-18, was attended by many representatives of countries conducting research in this field. The main topics included: (1) general problems of space biology and medicine; (2) acrophysiology; (3) optimal parameters of closed environment; (4) life support and protection; (5) psychophysiology and human-factor engineering; and (6) exobiology.

A66-81109

INTERPRETATION OF HALDANE'S TEST FOR STUDYING THE TOXIC PROPERTIES OF CARBON MONOXIDE [OB INTERPRETATSII OPYTOV Kholdena po izucheniiu toksicheskikh svoistv okisi ugleroda].

B. M. Shtabakii (Lvov Med. Inst., Dept. of Gen. Hyg., UkrSSR).

Gigiena i Sanitariya, vol. 30, no. 11, Nov. 1965, p. 92-94. 23 refs. In Russian.

According to J. S. Haldane's theory (1895), carbon monoxide is a biologically innocuous gas which blocks the access of oxygen to the hemoglobin molecule. Present day experiments show that CO in concentrations used by Haldane, produces a toxic effect on tissues. Very likely, the total effect of keeping tissues in normal state, when CO is used with pure O₂, is the prevention of oxygen toxicity, if the CO tension exceeds the O₂ tension. It is also known that CO prevents some of the damage caused by exposure of an organism to ionizing radiation. Even this fact cannot preclude the possibility of toxic effect of CO when certain conditions exist, by its direct action on tissues.

A66-81110

STANDARDS OF INDUSTRIAL NOISE (CERTAIN COMMENTS ON THE "OLD" AND "NEW" STANDARDS) [O NORMIROVANI PROIZVODSTVENNOGO SHUMA (NEKOTORYE ZAMECHANIA OTNOSITEL'NO "STARYKH" I "NOVYKH" NORM)].

A. P. Pronin (Leningrad Inst. of Eng. of Railroad Transportation, Dept. of Tech. Safety, Lab. of Noise Elimination of Railroad Transportation, USSR). *Gigiena i Sanitariya*, vol. 30, no. 11, Nov. 1965, p. 94-97. In Russian.

Revision of standards for regulation of permissible noise in industrial plants is presented. The amount of noise must be considered from the standpoint of level of sound pressure and the relationship between its components and the time of exposure. Correction for the impulse and the length of spectrum would add to the accuracy of standard formulation.

A66-81111

CONSTRUCTION OF A MATHEMATICAL MODEL OF "BIOLOGIC CLOCK"
[K POSTROENIU MATEMATICHESKOI MODELI "BIOLOGICHESKIKH CHASOV"]

B. S. Moshkov, I. A. Fushanskii, and G. I. Iuzefovich (USSR, Acad. of Sci., A. N. Bakh Inst. of Biochem., Moscow).
Doklady Akademii Nauk SSSR, vol. 167, no. 2, Mar. 11, 1966, p. 440-443. In Russian.

A functional mathematical expression of the biological clock for higher plants is presented. The same model can be used for the study of the biological rhythm of animals.

A66-81112

CATECHOLAMINES OF THE ADRENAL MEDULLA AND THE MORPHOLOGICAL CHANGES OF THE ADRENAL MEDULLA IN THE COURSE OF ADAPTATION TO REPEATED IMMOBILIZATION STRESS [KATECHOLAMINY DRENE NADOBLICKY A JEJ MORFOLOGICKE ZMENY V PRIEBEHU ADAPTACIE NA OPAKOVANY IMOBILIZACNY STRES].

R. Kvěťanský, A. Mitro, L. Míkulaj, and G. Hocman.
Bratislavské Lekárske Listy, vol. 46, Jan. 1, 1966, p. 35-41. 16 refs. In Polish.

Histological changes of the adrenal medulla of rats were studied during adaptation to immobilization stress. An increase in the number of cells in the adrenal medulla was found in the adapted animals. The increase was confirmed by weight determinations and by cell counts per surface area. Simultaneous karyometric measurements of nuclei of adrenal medulla cells and the analysis of catecholamine content of the adrenals agreed with the increased activity of the adrenal medulla during adaptation.

A66-81113

METABOLIC REACTION OF THE ORGANISM TO STRESS AND SOME OF ITS HORMONAL MECHANISMS [METABOLICKA REAKCIA ORGANIZMU NA ZATAZENIE A NIEKTORÉ JEJ HORMONÁLNE MECHANIZMY].

M. Vigaš, S. Nemeth, and R. Kvěťanský.
Bratislavské Lekárske Listy, vol. 46, Jan. 1, 1966, p. 42-46. 13 refs. In Polish.

Following experimental trauma in the Noble-Collip drum and in the course of immobilization stress, similar metabolic reactions were found in rats. The increase in glycemia showed two peaks with a pronounced drop of the level between them. Likewise, the modifications of non-esterified fatty acids exhibited a two-phase course, but in the opposite sense to glycemia. Pyruvic acid and inorganic phosphate levels were at their highest immediately after the trauma and at the beginning of immobilization. From the changes of the metabolic reaction to stress in diabetic rats, it is probable that increased release of insulin caused the drop in glycemia and non-esterified fatty acid levels. The finding supplements the results of previous experiments in which it was established that the first rise in glycemia during stress is due to released catecholamines. The second peak of the metabolic reaction is presumed to be in connection with an increased level of glucocorticoid hormones.

A66-81114

INTERACTION OF STRESS REACTIONS OF THE PITUITARY-ADRENOCORTICAL SYSTEM DURING TELESTIMULATION OF THE HYPOTHALAMUS OF RATS [INTERAKCIA STRESOVYCH REAKCII HYPOFYZO-ADRENOKORTIKALNEHO SYSTEMU PRI TELESTIMULACII HYPOTALAMU U POTKANOV].

V. Jonc and K. Murgaš.
Bratislavské Lekárske Listy, vol. 46, Jan. 1, 1966, p. 47-52. 5 refs. In Slovak.

The hypothalamus was stimulated electrically in rats during acute isolation and cold stress in order to study the mechanism of reactions in relation to other simultaneous processes of the organism. Stimulation of the posterior hypothalamus activated the pituitary-adrenocortical system, while stimulation of the anterior hypothalamus inhibited the activation. The finding, however, must be interpreted against the background of dynamic analysis; in some stages of the experiment paradoxical reactions were observed, e.g., a drop in the plasma corticosterone level after a subsequent stress. The phenomenon is interpreted as being due to chronic stress of animals, such as that resulting from surgical trauma, increasing the sensitivity and promptness of anti-regulatory mechanisms by its dominant action.

A66-81115

EFFECT OF HYPOXIA ON OXYGEN TRANSPORT IN SHEEP WITH DIFFERENT HEMOGLOBIN TYPES.

Terence J. Dawson and John V. Evans (New England U., Dept. of Physiol., Armidale, New South Wales, Australia).
American Journal of Physiology, vol. 210, May 1966, p. 1021-1025. 18 refs. New England U., Australian Wool Res. Comm., and Rural Credits Develop. Fund, supported research.

In domestic sheep there exist two genetically determined types of hemoglobin which have considerably different oxygen affinities. It has been suggested that the hemoglobin type of sheep may influence its tolerance to hypoxia. To examine this suggestion, sheep with different hemoglobins were subjected to a hypoxic stress (a 20-min. exposure to 9.3% oxygen in nitrogen) and their cardiovascular and respiratory responses were measured. The results obtained showed that sheep with the higher oxygen affinity hemoglobin (Hb-A) were more resistant to the imposed hypoxia than sheep with lower oxygen affinity hemoglobin (Hb-B). The arterial oxygen saturation of sheep with Hb-B fell significantly more than that of sheep with Hb-A, and sheep Hb-B also had a greater respiratory response. The greater tolerance of sheep with Hb-A was, however, most clearly demonstrated by the data which showed that although most sheep with Hb-B suffered cardiac crises before the 20-min. exposure period had elapsed, no crisis occurred in any sheep with Hb-A.

A66-81116

EFFECTS OF AMBIENT PRESSURE ON THE TOLERANCE OF MICE TO AIR BLAST.

Edward G. Damon, Donald R. Richmond, and Clayton S. White (Lovelace Found. for Med. Educ. and Res., Albuquerque, N. Mex.).
Aerospace Medicine, vol. 37, Apr. 1966, p. 341-347. 15 refs. Contract DA-49-146-XZ-055.

Mice were exposed to overpressures of "long" duration in the expansion chamber of an air-driven shock tube inside which the initial, preblast pressures were varied over sixfold. When the animals were held at the initial pressure for one hour following the blast before being returned to the ambient pressure of the laboratory, tolerance values, expressed as LD₅₀-1-hour gauge pressures, increased fourfold; they were 20.3, 31.0, 44.5, 55.4, and 91.8 p.s.i. for initial pressures of 7, 12, 18, 24, and 42 p.s.i., respectively. When animals were returned to ambient level soon after blast exposure, the LD₅₀ pressures were lower than the above values for initial pressures greater than ambient, and higher for initial pressures lower than ambient. The feasibility of scaling biological blast effects as a function of altitude is discussed and one approach suggested by available empirical data is regarded as a promising, but tentative procedure.

A66-81117

CURRENT CONCEPTS AND PRACTICES APPLICABLE TO THE CONTROL OF BODY HEAT LOSS IN AIRCREW SUBJECTED TO WATER IMMERSION. E. L. Beckman, E. Reeves and R. F. Goldman (Naval Med. Res. Inst., Bethesda, Md. and U. S. Army Res. Inst. of Environ. Med., Natick, Mass.).
Aerospace Medicine, vol. 37, Apr. 1966, p. 348-357. 25 refs.

The problem of providing adequate clothing for personnel who either accidentally or otherwise are immersed in cold water has continued to challenge clothing manufacturers for the past decade. The development of foamed plastics and other clothing materials offers new possibilities. Likewise new advances in energy conversion systems offer new solutions to this critical operational problem. The basic physical and physiological concepts which pertain to the problem of limiting thermal loss from the immersed human are reviewed. The newer technical developments in insulative clothing and supplemental heating systems are reviewed and discussed with relation to these basic concepts.

A66-81118

INFLUENCE OF LONG-TERM LOWER BODY NEGATIVE PRESSURE ON THE CIRCULATORY FUNCTION OF MAN DURING PROLONGED BED REST. Paul M. Stevens, Perry B. Miller, Charles A. Gilbert, Theodore N. Lynch, Robert L. Johnson, and Lawrence E. Lamb (USAF School of Aerospace Med., Aerospace Med. Sci. Div., Internal Med. Branch, Brooks AFB, Tex.).
Aerospace Medicine, vol. 37, Apr. 1966, p. 357-367. 21 refs.

Exposure to lower body negative pressure (LBNP) for 8 hours a day during a four-week period of absolute bed rest significantly prevented the orthostatic intolerance and plasma volume loss resulting from prolonged bed rest. A mean plasma volume loss of 332 cc. was seen in the control subjects who were at pure bed rest while test subjects exposed daily to LBNP during bed rest showed no significant change from baseline. Following bed rest, resting recumbent heart rates were significantly higher in control subjects but unchanged in the test subjects; orthostatic heart rates although higher in both groups increased significantly less in the test subjects. Following bed rest the incidence of syncope was significantly higher in the control subjects but was unchanged from before bed rest in the test subjects. Hemodynamic cardiovascular measurements suggest that in response to acute sustained LBNP following bed rest, test subjects have a smaller increase in heart rate while the cardiac index decreases less than in the controls. Resting recumbent forearm blood flow is lower following four weeks of bed rest with LBNP

than following bed rest alone. The increase in venous tone which occurs in response to acute exposure to LBNP is not apparent following pure bed rest but persists following bed rest with LBNP conditioning. Potential mechanisms responsible for these findings and their implications are discussed.

A66-81119

EFFECT OF DISCONTINUOUS EXPOSURE OF RATS TO A HIGH OXYGEN-LOW PRESSURE ENVIRONMENT.

John Patrick Jordan, John B. Altred, Charles L. Cahill and Robert T. Clark (Oklahoma City U., Dept. of Chem., Okla.)

Aerospace Medicine, vol. 37, Apr. 1966, p. 368-371. 9 refs.

NASA Grant Nsg 300-63.

The effect of a simulated space capsule environment (5.2 p.s.i.a. and 94% O₂) on the metabolism of 350-420 g. rats was studied after an exposure of 8 hours per day for 36 days. No significant difference was observed in body weight or organ weights when compared with control animals which were maintained under normal atmospheric conditions. After injecting pairs of rats with acetate-2-C¹⁴ at varying times prior to sacrifice, the turnover rates of lipids were studied in liver, heart, and kidney. The expiration rate of C¹⁴O₂ was also determined. In general, the metabolic rate of the experimental animals was reduced at least 10%; metabolically the animals did not appear to adapt to the environment over the 36-day test period. Major alterations were observed in the metabolism of lipids, particularly fatty acids.

A66-81120

HYPOXEMIA INDUCED IN MAN BY SUSTAINED FORWARD ACCELERATION WHILE BREATHING PURE OXYGEN IN A FIVE POUNDS PER SQUARE INCH ABSOLUTE ENVIRONMENT.

W. C. Alexander, R. J. Sever and F. G. Hopkin, Jr. (NASA Manned Spacecraft Center, Houston, Tex. and Aviation Med. Acceleration Lab., Johnsville, Pa.)

Aerospace Medicine, vol. 37, Apr. 1966, p. 372-378. 17 refs.

Presently planned atmospheric entry missions were simulated with respect to predicted acceleration profiles and gaseous environment. Arterial oxygen saturation was measured by earpiece oximetry calibrated with Van Slyke analyses of arterial blood samples collected simultaneously under acceleration. The patterns and severity of hypoxemia were studied by varying the magnitude and duration of the acceleration exposure and the environment of the pilot. The patterns and severity of hypoxemia induced by forward acceleration varied as a function of the magnitude and duration of the exposure and the gaseous environment of the experimental subject. Saturation levels below 80% were uncommon under the conditions of this simulation; however, marked deviations from this value were encountered. Although the present investigation was designed to evaluate the tolerability of the space crew to the dynamic and environmental conditions of manned earth entry characteristics of the Apollo mission, some relevant findings concerning the probable mechanisms of acceleration-induced hypoxemia are discussed.

A66-81121

USE OF TWO QUALITATIVE INDICES AS PREDICTORS OF SUCCESS IN FLIGHT TRAINING.

Paul Richard Jeanneret, and Charles W. Hutchins, Jr. (U.S. Naval Aerospace Med. Inst., U. S. Naval Aviation Med. Center, Pensacola, Fla.)

Aerospace Medicine, vol. 37, Apr. 1966, p. 379-382.

Two qualitative variables, procurement source and military rank, were employed to supplement the current multiple prediction formulae that identify students with low probabilities of successfully completing the U. S. Navy Flight Training Program. Also two dichotomous criterion variables, completion vs. attrition and voluntary withdrawal vs. all other attrition, were created, and the Wherry-Doolittle method of test selection was used to compute multiple prediction formulae for both criteria. The results indicated that the inclusion of the qualitative variables increased the multiple correlations in every case for both criteria. Since these preliminary findings are encouraging, the next step must be to include all qualitative variables available in one intercorrelation matrix and determine the total benefit to the multiple prediction formulae accruing from this method.

A66-81122

HUMAN RESPONSE TO PREDICTED APOLLO LANDING IMPACTS IN SELECTED BODY ORIENTATIONS.

William K. Brown, Jerry D. Rothstein and Peter Foster (6571st Aeromed. Res. Lab., Bio-Effects Div., Biodyn. Branch, Holloman AFB, N. Mex.)

Aerospace Medicine, vol. 37, Apr. 1966, p. 394-398. 14 refs.

NASA Contract PR T-13335 (C).

Two hundred eighty-eight human impact experiments were accompanied on a linear decelerating device (the Daisy Decelerator) for the purpose of studying human response to g forces in certain body orientations likely to occur during impact of the Apollo command module. A proposed Apollo restraint system was used in all human tests. It was observed that impact forces produced effects on the nervous, cardiorespiratory, and musculoskeletal systems. Neurological effects of impact were momentary stunning

and disorientation. A consistent effect on the cardiovascular system was transitory post-impact slowing of the heart rate in those body orientations in which the decelerative force acted in a forward direction (inertial force acted headward). A theory is presented to explain this effect. Respiratory effects of impact were momentary shortness of breath and chest pain. Effects on the musculoskeletal system were soreness and spasm of muscle groups of the neck and back. Since no effect on the human subject was severe enough to exceed human tolerance, the test program results demonstrate that man can endure certain predicted Apollo landing impact forces in different body orientations without significant incapacitation or undue pain.

A66-81123

EFFECTS OF SHORT-TERM BED REST AND WATER IMMERSION ON PLASMA VOLUME AND CATECHOLAMINE RESPONSE TO TILTING.

Daniel E. Torphy (USAF School of Aerospace Med., Biodyn. Branch, Acceleration Sect., Brooks AFB, Tex.)

Aerospace Medicine, vol. 37, Apr. 1966, p. 383-387. 26 refs.

The urinary excretion of norepinephrine and epinephrine measured in five subjects when tilted to 44° after six hours of either normal activity, bed rest inactivity or immersed inactivity showed the same expected rise regardless of the preceding condition. This suggests that vasoconstrictive response to orthostasis, as demonstrated by norepinephrine excretion, is not impaired by six hours of immersion. Plasma volume measured before and after six hours of normal activity, bed rest inactivity, immersed activity, and immersed inactivity showed mean plasma volume changes of +114 ml., -146 ml., -284 ml., and -290 ml., respectively, indicating that recumbency reduces plasma volume and immersion reduces it further. Negative pressure breathing was not present during immersion. Fluid volume loss is considered as a possible primary cause of orthostatic intolerance following water immersion experiments.

A66-81124

IN-FLIGHT RESPONSE TO A NEW NON-GYROSCOPIC BLIND FLIGHT INSTRUMENT.

Stanley R. Mohler and A. Howard Hasbrook (Civil Aeromed. Res. Inst., Oklahoma City, Okla.)

(*Aerospace Med. Assn.*, New York, Apr. 28-29, 1965).

Aerospace Medicine, vol. 37, Apr. 1966, p. 388-394.

Flying Physicians Assn. supported research.

Pilot responses to a new "geomagnetic" non-gyroscopic blind flight instrument were recorded during flight, utilizing an aircraft typical of those flown by many general aviation pilots. Data were obtained under induced conditions of loss of control during simulated instrument flight utilizing subjects ranging from student pilots with as little as 6 hours of flight time to commercial pilots with up to 10,000 hours experience. The device used in tests of human response during simulated blind flight was the Kenyon instrument. This is a small, light weight, self-contained instrument which requires neither electrical power nor vacuum source. It is non-tumbling and is not susceptible to turbulence. Comparisons of pilot response with the Kenyon instrument and the conventional "turn and bank" instrument were an integral part of the tests. More positive and smooth control was obtained with the new instrument. Also, there was a marked decrease in onset and severity of vertigo with the Kenyon instrument.

A66-81125

OTOLITH ORGAN ACTIVITY WITHIN EARTH STANDARD, ONE-HALF STANDARD AND ZERO GRAVITY ENVIRONMENTS.

Earl F. Miller, Ashton Graybiel and Robert S. Kellogg (U. S. Naval Aviation Med. Center, U. S. Naval Aerospace Med. Inst., Pensacola, Fla.)

Aerospace Medicine, vol. 37, Apr. 1966, p. 399-403. 22 refs.

Office of Advan. Res. and Technol. supported research.

Otolith activity was measured by ocular counterrolling response to body tilt within a force field of zero g, one-half, and standard g and to determine the effect of extralabyrinthine factors upon counterrolling under these gravitational conditions, in individuals with bilateral labyrinthine defects and normal persons. Transient periods of subgravity force (0.5 g, zero g) were produced by parabolic flight maneuvers in a specially equipped aircraft (C-131B) which accommodated a tilt chair and accessory apparatus for recording counterrolling response at upright and with body tilt ($\pm 25^\circ$, $\pm 50^\circ$). Testing under 1.0 g conditions was accomplished during periods of straight and level flight. The labyrinthine-defective (L-D) group revealed results which were qualitatively similar to those from the normal group but markedly reduced in magnitude. This demonstrated that extralabyrinthine factors were not significantly influencing extraocular muscle tonus, and that ocular counterrolling served as a valid and sensitive indicator of otolith activity under hypogravitic conditions. In the normal subjects zero g induced a physiological deafferentation of the otolith organs as indicated by the lack of any significant

counterrolling response when the subjects were tilted rightward or leftward up to 50°. When the gravitational force equalled approximately 0.5 g, the magnitude of counterrolling fell substantially below the level midway between the zero and Earth standard gravity response. The nonlinear relationship between otolith activity and subgravity force that is implied in these data and confirmed in a follow-up study is discussed.

A66-81126

FEAR OF FLYING AND THE COUNTER-PHOBIC PERSONALITY.

Alan I. Morgenstern (USAF School of Aerospace Med., Aerospace Med. Sci. Div., Psychiat. Branch, Brooks AFB, Tex.)
Aerospace Medicine, vol. 37, Apr. 1966, p. 404-407. 6 refs.
USAF Systems Command supported research.

Air Force fliers who became afraid to fly often share similar patterns of unrecognized psychopathology. Case studies reveal a sequence of childhood fears more intense and protracted than usual, counter-phobic fearlessness in teen-age and adult years as a defensive mode of life, and finally reversal of the intense need to fly into an equally strong fear of flying. Overt phobias in fliers are precipitated by stresses similar to those predisposing to other neurotic illnesses. If a career in aviation was chosen primarily for counter-phobic reasons the susceptibility to neurosis under these stresses is greatly augmented. Treatment is difficult and "cure" may comprise no more than a return to the previous counter-phobic adjustment. When the history of an applicant for flying training suggests severe childhood phobias or persistent participation in dangerous work or recreation, a psychiatric consultation is needed. If the consultant confirms the presence of repetitive counter-phobic traits the applicant should be disqualified.

A66-81127

SIDE EFFECTS OF SOME ANTIMOTION SICKNESS DRUGS AS MEASURED BY PSYCHOMOTOR TEST AND QUESTIONNAIRES.

R. E. Kennedy, C. D. Wood, A. Graybiel and R. B. McDonough (U. S. Naval School of Aviation Med., Aerospace Med. Inst., Pensacola, Fla.)
Aerospace Medicine, vol. 37, Apr. 1966, p. 408-411. 11 refs.

The results of this research indicate that many of the side effects of the depressant drugs such as hyoscine and meprobamate can be relieved by combination with d-amphetamine. By the same token, some of the stimulatory effects of d-amphetamine are relieved by a combination with a depressant. It was found that both questionnaire and psychometric techniques are necessary to more fully measure the side effects of drugs. Some persistent reports of side effects on the questionnaire were not correlated with the psychometric findings. Also, some side effects measured by the psychometric methods were not reported on the questionnaire. Hyoscine (0.6 mg.) and d-amphetamine (10 mg.) produced the most pronounced side effects while meprobamate (50 mg.) and trimethobenzamide (250 mg.) produced fewer side effects.

A66-81128

THE COMPULSIVE FLYER.

Roger F. Reinhardt (U.S. Naval School of Aviation Med., Pensacola, Fla.)
Aerospace Medicine, vol. 37, Apr. 1966, p. 411-413. 6 refs.

The significance of compulsive personality traits in the aviator is examined. "Compulsive" implies here a tendency toward over-organization, over-conscientiousness, perfectionism, and an inability to relax. An illustrative case is presented of a very proficient but compulsive flight student who struck a psychological snag in the Advanced Radio Instrument phase of jet training. Clinical experience has shown that compulsive people generally make fine professional aviators. They are intelligent, safe and dependable. On the other hand, instrument training is hard for them; they lack flexibility, and they often develop headaches. In new situations which are difficult to organize and clearly conceptualize, when novel problems require novel responses, they are at their worst. In workaday flying, with a premium on care, method, timing, and preparation, they are at their best, and probably the best.

A66-81129

MEDICAL ASPECTS OF AIRCRAFT PILOT FATIGUE WITH SPECIAL REFERENCE TO THE COMMERCIAL JET PILOT.

Otto B. Schreuder.
Aerospace Medicine, vol. 37, Apr. 1966 (Section II), iv+44 p. 241 refs.
Med. Comm. of the Air Transport Assn. of Am. supported research.

Studies of flight fatigue, with a particular reference to the commercial jet pilot, are reviewed and discussed. The following are included: (1) general discussion of fatigue, (2) operational aspects of flight fatigue (including cockpit environment, humidity, ozone, radiation, microwave radiation of radar waves, visual problems, acceleration, climatic changes, hypoxia, noise, and vibration), non-operational aspects of flight fatigue (embracing psychological factors, professional attitude, off-duty activities, physical condition, and fear of flying, circadian rhythm, flight-time limitations, technological aspects, accidents and fatigue, and socio-economic aspects), and (3) aging, health of the airline pilot, and prevention of fatigue (including exercise and physical fitness, overweight, cigarette smoking, nutrition and diet, alcohol, use of

drugs, and steps to be taken before, during, and after flight). It is concluded that the occurrence of pilot fatigue is not common in the airline pilot, that the latter is healthier than the general male population, and that there is nothing to indicate that flying the turbojet is deleterious to health or is conducive to premature aging.

A66-81130

THYROCALCITONIN ACTIVITY OF PARTICULATE FRACTIONS OF THE THYROID GLAND.

Walter C. Bauer and Steven L. Teltelbaum (Washington U., School of Med., Div. of Surg. Pathol., Dept. of Pathol., St. Louis, Mo.)

Laboratory Investigation, vol. 15, Jan. 1966, p. 323-329. 19 refs.
Grants NIH GM-08574-03 and 5T1GM 897-04; and John A. Hartford Found. supported research.

Hog thyroid homogenates containing cytoplasmic particles show hypocalcemic activity. The biochemical behavior of the active material is consistent with that of thyrocalcitonin. A 3-fold concentration of activity is obtained by partial purification of the particulate fraction. The results of sonic disruption of active particle fractions suggest that the hormone is contained within a "secretory granule" possessing some structural stability. "Granules" are seen in electron micrographs from an active particle fraction from sucrose density centrifugation which morphologically resemble those seen in electron micrographs of parafollicular cells of hog thyroid. These findings suggest that the parafollicular cell is a possible source of thyrocalcitonin.

A66-81131

THE POSSIBLE ROLE OF BROWN FAT AS A SOURCE OF HEAT DURING AROUSAL FROM HIBERNATION.

J. S. Hayward, C. P. Lyman, and C. R. Taylor (Harvard Med. School, Dept. of Anat., Boston, Mass.)

Annals of the New York Academy of Sciences, vol. 131, Art. 1, Oct. 8, 1965, p. 441-446. 20 refs.

Brown fat thermogenesis was measured during arousal of two hibernators, the big brown bat (*Eptesicus fuscus*) and the golden-mantled ground squirrel (*Citellus lateralis*). The data indicate that brown fat is a more important source of heat for arousal from hibernation in bats than in rodents. Within two minutes of initial disturbance, the temperature of the brown fat of bats had increased rapidly to surpass the heart temperature, and remained about 1° C. above heart temperature throughout arousal. Arousal in squirrels was much slower than in bats; the animals required at least 90 minutes for complete warming. The temperature of the brown fat in squirrels remained just less than 1° C. below heart temperature for the majority of the arousal.

A66-81132

METABOLIC STUDIES ON THE RELATIONSHIP OF DIET TO ENERGY BALANCE AND BODY MASS DURING WEIGHT REDUCTION IN MICE.

A. Kelwick and G. L. S. Pawan (Middlesex Hosp. Med. School, Dept. of Med. and Inst. of Clin. Res., London, Great Britain).

Annals of the New York Academy of Sciences, vol. 131, Art. 1, Oct. 8, 1965, p. 519-527. 6 refs.

Three assumptions which concern the thermodynamic "steady state" of living organisms are examined in terms of experiments previously performed on mice and humans. The premises that energy value of food intake is equal to body mass is based on (1) most or all the food must be broken down to CO₂ and water; (2) in a constant and adequate food intake, the energy value of the carcass of the normal adult animal should remain constant; and (3) there is a constant loss of total energy from the animal when food intake is constant. In summary, it is probable that through changes in composition of the diet, the type of feeding habits, and the activity of responsive glands, an intact animal can alter metabolic pathways which control the equating of its energy needs and body mass.

A66-81133

CLOTHING INSULATION AND ACCIDENTAL HYPOTHERMIA IN YOUTH.

L. G. C. Pugh (Nat. Inst. for Med. Res., Div. of Human Physiol., Hampstead, London, Great Britain).

Nature, vol. 209, Mar. 26, 1966, p. 1281-1286. 23 refs.

The effects of exercise, wind, and wetting on oxygen intake and on the thermal insulation of a typical clothing assembly (1.5 clo units) used for hill walking and climbing in England were observed and calculated. The insulative properties of the clothing fell with all three variables. A combination of wet clothing, exercise, and a 9-m.p.h. wind lowered insulation value to 0.17 clo. Oxygen intake during exercise in dry clothing in a 9-m.p.h. wind was 0.990-1.100 liters/min., while addition of wetting increased the oxygen intake by 50%, to 1.529 liters/min.

A66-81134

RUBROSPINAL INFLUENCES DURING DESYNCHRONIZED SLEEP. M. M. Gassel, P. L. Marchiafava, and O. Pompeiano (Pisa U., Dept. of Physiol., Italy).

Nature, vol. 209, Mar. 19, 1966, p. 1218-1220. 8 refs.

The influence of the red nucleus on the phasic discharge of flexor motor neurons during wakefulness and sleep was investigated in cats by the use of electroencephalogram, electromyogram, and the recording of eye movements. During bursts of rapid eye movement (REM), which characterize the desynchronized phase of sleep, a phasic enhancement of ribral activity occurred, which was similar to that observed in the pyramidal tract. An increase of red nucleus activity also occurred during synchronized sleep, synchronously with the spindle bursts. The flexor response induced by iterative stimulation of the red nucleus was depressed throughout desynchronized sleep, while myoclonic twitches were still present in contralateral flexor muscles after electrolytic lesion of the red nucleus, or combined lesions of red nucleus and pyramidal tract.

A66-81135

INFLUENCE OF COLD ON THYROID UPTAKE OF IODINE-131 AND CIRCULATING IODINE COMPOUNDS.

J. F. Salvaneschi, N. Altschuler, and C. Enrioli (Centro de Endocrinol., Cln. de Endocrinol. y Metab., Buenos Aires, Argentina).

Nature, vol. 209, Mar. 19, 1966, p. 1240-1241. 18 refs.

The effects of cold ($4-6^{\circ}\text{C}$) on thyroid gland uptake of ^{131}I were measured in rats. Control animals and those exposed to cold for two hours had similar radiiodine uptake, while animals exposed to cold for 24 hours showed a significant decrease in uptake. Animals exposed to cold for two hours and 24 hours exhibited a significantly lower free-thyronine fraction than the controls. Protein-bound ^{131}I values were not statistically different when the three groups were compared.

A66-81136

HYPERBARIC OXYGENATION.

Charles B. Pittenger (Vanderbilt U., School of Med., Dept. of Pharmacol., Nashville, Tenn.)

Springfield, Ill., Charles C Thomas Publisher, 1966, ix+113p. 448 refs.

The physiological aspects of hyperbaric oxygen (H_2O) are reviewed and some of the medical applications are discussed, including cancer therapy; surgery; anaerobic and other infections; resuscitation from poisoning, asphyxia, and cardiac arrest; cardiovascular insufficiency; shock; hyaline membrane disease; and anesthesia. Oxygen toxicity, decompression sickness, and nitrogen narcosis are also examined. Brief comments are made regarding safety in H_2O therapy and 24 items for precautionary measures are listed.

A66-81137

ON THE ANALYSIS OF ADAPTIVE PROCESSES DURING ORIENTATION IN SPACE [ZUR ANALYSE ADAPTIVER PROZESSE BEI DER ORIENTIERUNG IM RAUM].

Hans-Georg Geissler (Humboldt-U., Inst. für Psychol., East Berlin, Germany). *Zeitschrift für Psychologie*, vol. 171, 1965, p. 45-56. 8 refs. In German.

A hypothesis is proposed that it is possible to draw conclusions as to the basic characteristics of the systems involved in a perceptual task. In perception of the vertical it is shown that the temporal course of the angular deviation between the objective and the phenomenal vertical perceived with head tilt in darkness (Aubert phenomenon) may be interpreted as approximating solutions of first order differential equations. Transformation functions found correspond to the behavior of a system in which proportional and differential functions act on a delay function. A dynamic phenomenon known as the β -effect is described hypothesizing a parameter varying with the conditions. With the assumption of additional physiologically plausible limits for the system structure it is possible to interpret the empirically derived parameters toward a behavioristic theory. Concepts of incomplete and complete signal elements are introduced in order to develop relative generalized methods for the testing of behavioristic models.

A66-81138

THEORETICAL ANALYSIS OF DETECTION IN TEMPORALLY UNSTRUCTURED EXPERIMENTS [EINE THEORETISCHE ANALYSE DER DETEKTION IN ZEITLICH NICHTSTRUKTURIERTEN EXPERIMENTEN].

Duncan Luce (Pa. U., Dept. of Psychol., Philadelphia).

Zeitschrift für Psychologie, vol. 171, 1965, p. 57-68. 19 refs. In German.

This is an attempt to derive a model, based on the neural quantum theory, for the analysis of signal detection experiments with a chance stimulus distribution. Simple relationships were found between the three distributions (two inter-response intervals and a stimulus-response interval) which served in the evaluation of parameters and for the testing of this model. In

addition to the sensory postulates of the neural quantum theory, the distinguishing postulate of the proposed model states that the sensory system, with respect to detection performance, is refractory to stimuli from the start to the end of the response. There are no data which contradict this assumption.

A66-81139

A BASIS FOR THE SYSTEM THEORETICAL SIMULATION OF ADAPTIVE PROCESSES WITH STOCHASTIC INPUT [EIN ANSATZ ZUR SYSTEM- THEORETISCHEN SIMULIERUNG ADAPTIVER PROZESSE BEI STOCHASTISCHEM EINGANG].

Werner Krause (Humboldt U., Inst. für Psychol., East Berlin, Germany).

Zeitschrift für Psychologie, vol. 171, 1965, p. 69-79. In German.

An optimal linear, temporally variable system is used for the description of the adaptive process in signal recognition. The mathematical model depicts the organic process when meaningful correction factors are introduced corresponding to the organic system. Experiments showed that in perceptual processes of this type a role is played by differential factors the characteristics of which may be dependent on frequency.

A66-81140

INVESTIGATIONS CONCERNING FIXATION AND TRACKING MOVEMENTS OF THE HUMAN EYE [UNTERSUCHUNGEN ZUR FIXATIONS- UND FOLGEBEWEGUNG DES MENSCHLICHEN AUGES].

H. Drischel (Karl-Marx-U., Physiol. Inst., Leipzig, East Germany).

Zeitschrift für Psychologie, vol. 171, 1965, p. 92-109. 10 refs. In German.

Fixation apparatus of the eye is conceived as a closed-loop feedback system, where the position of the eyeball to the object of fixation or the view-angle is the variable. Sensors are the light-sensitive elements of the fovea, cones in particular. These operate as proportional as well as differential ratio sensors. Visual cortex and central oculomotor switch mechanisms function as the regulator. Effectors are the six external eye muscles working a defined sequence, usually paired. A subordinate feedback system consists of stretch-sensitive muscle spindles. Their task is to transmit information on muscle tone to the oculomotor centers. The dynamics are those of an integral proportionate feedback system with a delay period. The author discusses within this framework continuous gliding eye movements and saccadic jumps, latency of the eye, phi phenomenon, optokinetic effect, Bode diagrams of human sinusoidal eye movements, alcohol effect on the tracking eye movements, unpredictable signal input, and other nonlinearities in the system.

A66-81141

PROPERTIES OF A CYBERNETIC SENSORIMOTOR LEARNING MODEL AT ADAPTIVE REGULATION OF THE EXPERIMENTAL SITUATION [EIGENSCHAFTEN EINES KYBERNETISCHEN SENSORIMOTORISCHEN LERNMODELLS BEI ADAPTIVER STEUERUNG DER EXPERIMENTALSITUATION].

Gordon Paak (System Res. Ltd., Richmond, Surrey, Great Britain).

Zeitschrift für Psychologie, vol. 171, 1965, p. 158-195. 34 refs. In German. Contract AFOSR AF 61(052)640.

Several cybernetic models of the learning process are proposed. In support are cited experiments on sensorimotor tasks, problem solving, etc. Also, an experimental method is suggested for the comparison of the interaction between a real subject and a real adaptive control mechanism with the interaction between a computer-programmed cybernetic model and a computer-simulated adaptive control mechanism.

A66-81142

ON THE PSYCHOLOGICAL STRUCTURE OF THE INFORMATION INPUT PROCESS IN MAN [ZUR PSYCHOLOGISCHEN STRUKTUR DES INFORMATIONSAUFNAHMEPROZESSES DURCH DEN MENSCHEN].

B. F. Lomoov (Zhdanov-U., Inst. für Psychol., Leningrad, USSR)

Zeitschrift für Psychologie, vol. 171, 1965, p. 296-305. In German.

Process of information input is reviewed with respect to the following perceptual processes and activities: signal detection, signal discrimination, signal identification, decoding, and interpretation. Each of these operations is discussed, touching upon relevant research. Evaluation of the so-called channel capacity requires a detailed analysis of those processes which effect the information input and which are basically perceptual processes. Research is cited toward the solution of the optimal coding of information for human input.

A66-81143

A NEUROCYBERNETIC MODEL OF THE REGULATION OF THE SEQUENTIAL COURSE OF VOLUNTARY MOVEMENTS [EIN NEUROKYBERNETISCHES MODELL DER REGELUNG DES ZEITLICHEN ABLAUFES WILKURLICHER BEWEGUNGEN].

Milan Brichcin (Karl-Marx-U., Psychol. Inst., Prague, Czechoslovakia).

Zeitschrift für Psychologie, vol. 171, 1965, p. 383-390. In German.

An automatic (discrete, synchronous, and deterministic) neurocybernetic system is described as a model of the nervous mechanisms responsible for the regulation of voluntary movements. The model is simple, but its functional capacity covers the entire range of the abduction and adduction of the lower arm determined experimentally. The model is structured in form of a neuronal grid. Its operation is demonstrated by reproduction of an extreme movement described by a diagram reading off the position of each element in the system at each time interval during the movement. A good fit is obtained between the projected values and the curve of experimentally obtained values for the effective muscle force. The neurocybernetic model is used in the interpretation of the data on voluntary movement and for the establishment of laws for the control and regulation of these movements.

A66-81144

EFFECTS OF ANOXIA ON CEREBRAL METABOLISM AND ELECTROLYTES IN MAN.

John S. Meyer, Fumio Gotoh, Shintichiro Ebihara, and Minoru Tomita (Wayne State U., Receiving Hosp., Depts. of Neurol. and Harper Hosp., Wayne Center for Cerebrovascular Res., Detroit, Mich.; and Kelo U., Dept. of Internal Med., Tokyo, Japan).

Neurology, vol. 15, Oct. 1965, p. 892-901. 22 refs.

USPHS and Receiving Hosp. Res. Corp. supported research.

Internal jugular blood gases and electrolytes were continuously recorded in 19 patients and correlated with electroencephalograms made during acute anoxemia induced by nitrogen inhalation. Acute anoxemia produced statistically significant decreases in oxygen and carbon dioxide tension but an increase in pH of the cerebral venous blood. Lowered oxygen tension of cerebral blood had a direct vasodilator effect on cerebral arterioles of man, independent of any changes in cerebral blood pCO_2 or pH. When cerebral venous oxygen tension fell below 18.95 ± 2.55 mm. Hg, electroencephalographic slowing regularly appeared regardless of other variables. A decrease in sodium and an increase in potassium ionic activity of the cerebral venous blood were observed in acute anoxemia, independent of arterial changes in these ions. These changes were statistically significant. It is concluded that during temporary anoxia, the brain gains sodium and loses potassium while the reverse occurs during recovery from anoxia and return of cerebral function. Ionic homeostasis and electric activity of the human brain appear to be dependent on oxidative metabolism.

A66-81145

THE GREENHOUSE EFFECT IN A GRAY PLANETARY ATMOSPHERE.

Rupert Wildt (Yale U. Obs., New Haven, Conn.; and Goddard Inst. for Space Studies, New York, N.Y.)

Icarus, vol. 5, Jan. 1966, p. 24-33. 6 refs.

Hopf's analytical solution is illustrated for several values of the greenhouse parameter, i.e., the ratio of gray absorption coefficients for insulating and escaping radiation, assumed to be constant at all depths. As the familiar planetary atmospheres are nongray in the extreme, this model of the greenhouse effect does not contribute much to understanding their temperature regime; but, to date, it is the only problem in planetary radiative equilibrium which has been solved rigorously.

A66-81146

BIOLOGICAL MATERIAL IN METEORITES: A REVIEW.

Harold C. Urey (Calif. U., Revelle Coll., San Diego).

(Intern. Council of Sci. Unions, Comm. on Space Res., Mar del Plata, Argentina, May 17-19, 1965).

Science, vol. 151, Jan. 14, 1966, p. 157-166. 33 refs.

NASA Grant NSG-541.

Estimations of the possibility of biological material within carbonaceous chondrites, especially in the Orgueil and Mighei chondrites, are examined.

Although chemical composition, optical activity, and microscopic thin section studies of the chondrites have indicated the possibility of the existence of extraterrestrial life, the problem of possible invasion of the chondrites by terrestrial organisms remains to be clarified.

A66-81147

DIRECT FLUORESCENT LABELING OF MICROORGANISMS AS A POSSIBLE LIFE-DETECTION TECHNIQUE.

Abe Pital, Sheldon L. Janowitz, Charles E. Hudak, and Evelyn E. Lewis (U. S. Army Biol. Labs., Fort Detrick, Frederick, Md.)

Applied Microbiology, vol. 14, Jan. 1966, p. 119-123. 12 refs.

Microorganisms and selected proteinaceous substances were directly tagged with fluorescein isothiocyanate. This approach suggested a possible application for detection of extraterrestrial life. A stable and apparently specific linkage was formed with protein, and nonprotein substances were readily destained. Soil and atmospheric debris did not exhibit any significant affinity for the dye.

A66-81148

CRITICAL REMARK REGARDING THE EXAMINATION OF THE TRACKING SYSTEM OF THE EYE WITH UNPREDICTABLE MOVEMENT OF THE TARGET [KRITISCHE BEMERKUNGEN ZUR UNTERSUCHUNG DES AUGENFOLGESYSTEMS MIT NICHTVORHERSAGBAREN BEWEGUNGEN DES ZIELOBJEKTS].

P. Lässig (Karl-Marx-U., Physiol. Inst., Leipzig, East Germany).

Acta biologica et medica germanica, vol. 14, 1965, p. 618-629. 14 refs. In German.

By example of the tracking systems of the eye, the author demonstrates that the transfer behavior of a nonlinear system depends on the kind of incoming signal. If a linear system is assumed, a different frequency response characteristic is obtained, depending on the type of signal input. The differences in the transfer behavior with predictable and non-predictable signals do not necessarily indicate learning properties, but may also be caused by the influence of nonlinearities in the transfer system.

A66-81149

THE INFLUENCE OF THE ADAPTATION AND THE INTENSITY OF THE LIGHT STIMULI ON THE PUPIL REFLEX OF THE EYE [DER EINFLUSS DES ADAPTATIONSZUSTANDES UND DER STARKE DER LICHTREIZE AUF DEN PUPILLENREFLEX DES AUGES].

E. Schubert and F. Thoss (Karl-Marx-U., Physiol. Inst., Leipzig, East Germany).

Acta biologica et medica germanica, vol. 14, 1965, p. 639-645. 14 refs. In German.

Consensual pupil reflexes depending on the intensity of the light stimulus (0.4 lux to 800 lux on the eye) and the state of adaptation (dark 0.4 lux to 800 lux) of the stimulated eye were recorded in three subjects. Variations occurred in the latency period and the course of the reflexes. The latency period diminished in all states of adaptation with increasing intensity of stimulation. At a constant intensity of stimulation it was also reduced with the adaptation to reduced light intensity. It covered an interval of about 370 to 220 msec. The quotient K defined the final deflection in the pupil surface from its initial value and the maximum variation during the reflex increased at all pre-exposures with increasing intensity of stimulation reaching the final value 1 at high intensities of stimulation. At constant intensity of stimulation and reduced pre-exposure, K was also increased. The findings are compared with the results of other authors.

A66-81150

QUANTITATIVE SEPARATION OF INORGANIC POLYPHOSPHATES IN CHLORELLA CELLS.

Ryuzi Kanai, Shigeji Aoki, and Shigetoh Miyachi (Tokyo U., Inst. of Appl. Microbiol. and Tokugawa Inst. for Biol. Res., Tokyo, Japan).

Plant and Cell Physiology, vol. 6, Sep. 1965, p. 467-473. 13 refs.

Four kinds of inorganic polyphosphates (poly-Pi) were quantitatively separated from P^{32} -labeled unicellular green algae (*Chlorella ellipsoidea*). The poly-Pi's were clearly separated from each other by successive extractions with 8% trichloroacetic acid (poly-Pi "A"), with cold KOH at pH 9 (poly-Pi "B"), and with 2 N KOH (poly-Pi's "C" and "D"); the former precipitates on neutralization with perchloric acid, leaving the latter in solution. Under normal photosynthetic conditions, poly-Pi's "A" and "C" function as intermediates, transferring phosphate from inorganic orthophosphate to deoxyribonucleic acid and phosphoprotein. Poly-Pi's "B" and "D" are phosphate reservoirs in the presence of excess phosphate in the culture medium, and are degraded to orthophosphate under phosphate deficiency.

A66-81151

DE- AND RE-GENERATION OF CHLOROPLASTS IN THE CELLS OF CHLORELLA PROTOTHECOIDES. IV. EFFECTS OF 5-FLUOROURACIL, DIHYDROSTREPTOMYCIN, CHLORAMPHENICOL AND ACRIDINE ORANGE ON THE PROCESSES OF GREENING AND DIVISION OF "GLUCOSE-BLEACHED" ALGAL CELLS.

Shigeji Aoki, Junko Khan Matsubara, and Eiji Hase (Tokyo U., Inst. of Appl. Microbiol. and Tokugawa Inst. for Biol. Res., Japan).

Plant and Cell Physiology, vol. 6, Sep. 1965, p. 475-485. 26 refs. Min. of Educ. supported research.

Marked greening of the glucose-bleached *Chlorella protothecoides* cells occurred after a lag period in the control culture. 5-Fluorouracil inhibited the cell greening strongly when it was applied at different times before the provision of urea and light. When applied after the provision of urea and light, the suppressive effect of 5-fluorouracil gradually decreased with the delay of its application. No inhibitive effect was observed when the uracil analogue was added later than the 12th hr. after the provision of urea and light, the time around which the chlorophyll formation started in the control culture. On the other hand, the cell division was much more strongly affected by 5-fluorouracil, indicating that the greening and division of the glucose-bleached cells are separate processes. Different mechanisms of action of the uracil analogue towards these two processes were suggested. Dihydrostreptomycin showed its strongest suppressive effect when added at the beginning of the dark incubation of algal cells in the glucose-free medium, and with the delay of application, its effect was progressively reduced, even during the period of

the dark incubation. The suppression, however, was still marked when it was applied at the 15th hr. Chloramphenicol inhibited the chlorophyll formation and protein synthesis, but, to a much lesser extent, RNA (ribonucleic acid) synthesis. Acridine orange suppressed the cell greening and division at such a low concentration as 1.5 µg/ml. Based on these observations it is concluded that synthesis of nucleic acid and protein are essential processes for the greening of the glucose-bleached algal cells. Successive events occurring in the greening process are discussed.

A66-81152

DE- AND RE-GENERATION OF CHLOROPLASTS IN THE CELLS OF *CHLORELLA PROTOTHECOIDES*. V. DEGENERATION OF CHLOROPLASTS INDUCED BY DIFFERENT CARBON SOURCES, AND EFFECTS OF SOME ANTIMETABOLITES UPON THE PROCESS INDUCED BY GLUCOSE. Shigeji Aoki, Mitsuo Matsuka, and Eiji Hase (Tokyo U., Inst. of Appl. Microbiol. and Tokugawa Inst. for Biol. Res., Tokyo, Japan). *Plant and Cell Physiology*, vol. 6, Sep. 1965, p. 487-497. 7 refs. Min. of Educ. supported research.

Green cells of *Chlorella protothecoides* were bleached to different extents when incubated (in the dark) in nitrogen-free media containing, besides basal mineral nutrients, glucose, fructose, galactose, glycerol, or acetate. Glucose and fructose had the strongest bleaching effect. Addition of a nitrogen source (urea) caused a considerable reduction of the bleaching. It is assumed that from the different carbon sources a certain common intermediate(s) causing the bleaching is formed, and that in the presence of the nitrogen source the substance is removed by reacting with it. Using glucose as the bleach-inducing agent, the effects of the antimetabolites mitomycin C, arsenite, and dihydrostreptomycin sulfate upon the processes of bleaching, division, and growth of green algal cells were investigated. The process of bleaching occurred without being accompanied by growth and division of the algal cells. During the process of bleaching no net increase in ribonucleic acid or protein took place.

A66-81153

INITIAL 'FITNESS' AND PERSONALITY AS DETERMINANTS OF THE RESPONSE TO A TRAINING REGIME. R. J. Shephard (Min. of Defence, Chem. Defence Exptl. Estab., Porton Down, Wilt., Great Britain). *Ergonomics*, vol. 9, Jan. 1966, p. 3-16. 18 refs.

Ventilatory and cardiac responses to the riding of an electrically braked bicycle ergometer were investigated in young male subjects during a variety of short intensive training regimes involving both maximal and sub-maximal work. In most experiments rides were repeated thrice daily for one week or two weeks. With maximal effort rides of 5 min. duration there was an increase in the rate of working over the training period. This was greater in a group performing one ride per day than in a second group (with slightly greater initial working capacity) performing three rides per day. In both groups the increase in rate of working was sufficient to mask any improvement in relative cardiorespiratory performance. With longer periods (15 or 30 min.) of heavy but sub-maximal work there was a progressive reduction of both the ventilatory and the cardiac response to exercise, and calculations suggested that the efficiency of muscular work was also increased. The magnitude of these changes could be related to initial fitness. Excess ventilatory work can itself limit performance and for this reason personality and psychological approach to successive work periods can influence both initial working capacity and also the response to a training regime.

A66-81154

INTER- AND INTRA-INDIVIDUAL DIFFERENCES IN ENERGY EXPENDITURE AND MECHANICAL EFFICIENCY. C. H. Wyndham, J. F. Morrison, C. G. Williams, N. B. Strydom, M. J. E. von Radden, L. D. Holdsworth, C. H. van Graan, A. J. van Rensburg, A. Joffe, and A. Heyns (Transvaal and Orange Free State Chamber of Mines, Math. Statist. Div., Johannesburg, South Africa). *Ergonomics*, vol. 9, Jan. 1966, p. 17-29. 12 refs.

Differences in oxygen consumption between individuals and also within individuals on 4 different tasks and at 2 rates of energy expenditure were examined. Criteria are proposed for indicating differences in physiological 'skill' between individuals and in some tasks such differences were found. Weight was found to be correlated with maximum oxygen intake, the factor which sets a limit to the maximum level of endurance work, and also correlated with oxygen consumption in two of the tasks. It is considered that differences between individuals in maximum oxygen intake is more important than are differences in oxygen consumption in tasks requiring prolonged physical effort. Gross mechanical efficiencies were estimated in order to compare the mean efficiencies of this group of men when performing different tasks.

A66-81155

INFORMATION INPUT AND RESPONSE TIME. Linden Hilgendorf (Aeron. Res. Labs., Melbourne, Australia). *Ergonomics*, vol. 9, Jan. 1966, p. 31-37. 21 refs.

A study of the relationship between information input and response times (RT) used visually presented, discrete symbols from six alphabets of up to 1000 alternatives and a key-pressing response. RT varied directly with information content ($\log_2 n$) with no tendency to deviate from a straight line at high levels of n . Three further experiments are suggested.

A66-81156

THE EFFECTIVE AREA OF THE HUMAN BODY WITH RESPECT TO DIRECT SOLAR RADIATION.

L. G. C. E. Pugh and F. A. Chrenko (Med. Res. Council Labs., Div. of Human Physiol., Hampstead, London, Great Britain). *Ergonomics*, vol. 9, Jan. 1966, p. 63-67. 9 refs.

Methods of determining the effective radiation area for direct solar radiation were compared. The ratio of effective area to total surface area was directly proportional to the cosine of solar altitude for all the methods considered. The photographic method of Underwood and Wark (1961) and the shadow method of Chrenko and Pugh (1961) gave lower values than those obtained from the cylinders of Taylor (1956) and the models of Tredre (1965).

A66-81157

EFFECT OF ACUTE SYSTEMIC ANOXIA ON CENTRAL VENOUS PRESSURE IN DOG.

J. Litwin, K. Skolastńska, and M. Augustyniak (School of Med., Dept. of Human Physiol., Warsaw, Poland). *Bulletin de l'Académie Polonaise des Sciences*, vol. 13, no. 9, 1965, p. 561-564. 9 refs.

Grant Rockefeller Found. GA MNS 60223.

The effect of acute systemic anoxia, produced by inhalation of 100% nitrogen over a period of 1.5 min. to 3.0 min., on the central venous pressure, was studied in 22 anesthetized, artificially ventilated open-chest dogs. A progressive rise of central venous pressure was observed in advanced anoxia, paralleling secondary anoxic bradycardia. It was significantly reduced after bilateral cervical vagotomy which caused attenuation of bradycardia.

A66-81158

PROTEIN FRACTIONS AND ELECTROLYTE LEVELS IN BLOOD SERUM OF RABBITS IN LOW ENVIRONMENTAL TEMPERATURE [FRACCJE BIAŁKOWE I POZIOM ELEKTROLITOW W SUROWICY KRWI KROLIKOW W NISKIEJ TEMPERATURZE ŚRODOWISKA].

Zygmunt Szkutnik. *Polskie Archiwum Weterynaryjne*, vol. 9, no. 1, 1965, p. 99-108. 31 refs. In Polish.

The influence of environmental temperature fall (from 24° C. to -9° C.) on the level of protein fractions and that of electrolytes (Na and K) in blood serum of rabbits was studied during 15 days in summer. After 5 days the level of total protein significantly increased mainly because of the increase of albumin; after 10 days a decrease of albumin level was found which persisted to the end of the experiment. In this time there occurred an increase of $\alpha_1 + 2$ and γ globulins which compensated for the decrease of albumin fraction in the general level of proteins. The values of γ globulins did not change during the time of experiment. The level of Na and K was characteristically lower after 5 days. After 10 days the Na level returned to the initial value, whereas the K level remained characteristically lower; after 15 days the values of both electrolytes were close to the initial values. The negative K and Na balance in the starting period was presumably due to a slightly increased secretion of the glucocorticoid hormone as the result of the stress influence of cold.

A66-81159

AUTONOMIC REACTIONS OF MAN DURING LOW-FREQUENCY VIBRATION STRESS [VEGETATIVE REAKTIONEN DES MENSCHEN BEI NIEDERFREQUENTER SCHWINGUNGSBELASTUNG].

R. Coermann, A. Okada, and I. Frieling (Max Planck-Inst. für Arbeitsphysiol., Dortmund, West Germany). *Internationale Zeitschrift für angewandte Physiologie*, vol. 21, no. 2, 1965, p. 150-168. 15 refs. In German.

Physiological and psychological effects of mechanical, vertical whole-body vibration with a constant acceleration of the oscillatory motion were studied in seven male subjects. The exposure duration was 30 min. with the frequency varied from 1 to 6 c.p.s. Physiological indices measured were finger pulse amplitude and eostnophil count. Reports of subjective sensations were graded on a seven-point scale. Changes in the amplitude of the finger pulse showed that from 1 c.p.s. the effect of vibration increased proportionally to the increase in vibration frequency. At 6 c.p.s. finger pulse amplitude reached its low point. Subsequently, at frequencies higher than 6 c.p.s. the effect decreased. Subjective sensations followed the amplitude of the finger pulse. No simple relationship was found in variation of the eostnophil count before and after exposure to vibration. This is viewed as due to the latency in the response of the endocrine system to stress. Sinusoidal vibrations with high overtones exerted a stronger effect than vibrations with low overtones.

Vibrations of the same amplitude of acceleration were tolerated better at 1 c.p.s. than at 5 or 6 c.p.s. At higher frequencies subjective sensations decreased in intensity.

A66-81160

COMPARATIVE INVESTIGATIONS REGARDING NITROGEN AND GLUCOSE ABSORPTION BY CHLORELLA FROM NUTRIENT SOLUTIONS AS RELATED TO MIXTURE CONDITIONS [VERGLEICHENDE UNTERSUCHUNGEN ÜBER DIE STICKSTOFF- UND GLUCOSE-AUFNAHME VON CHLORELLA AUS NAHRLOSUNGEN IN ABHÄNGIGKEIT VON DEN DURCHMISCHUNGS-BEDINGUNGEN]. Klaus Muntz (Deut. Akad. de Wiss., Inst. für Kulturpflanzenforsch., Berlin und Abt. Ökol. Pflanzenphysiol., Potsdam, East Germany). *Zeitschrift für Allgemeine Mikrobiologie*, vol. 5, no. 5, 1965, p. 362-377. 24 refs. In German.

Cultures of *Chlorella pyrenoidosa* were cultivated for four days in continuous light to achieve nitrogen- and carbohydrate-poor cultures. Three-hour experiments were conducted to explore the effect of various methods of mixing on the glucose and nitrogen consumption in light and darkness cultures. In most experiments nitrogen consumption was greater from ammonia salts than from nitrates. In unmixed cultures in the dark the reverse was true. Differences in the mixing methods resulted in a greater uptake of nitrogen from nitrates than from ammonia. Similarly quantitative differences were observed in glucose consumption with different culture techniques and experimental conditions.

A66-81161

EFFECTS OF TEMPERATURE VARIATION ON THE DISCHARGES OF A MONOSYNAPTIC REFLEX. ROLE OF SIMULTANEOUS VARIATION OF $PACO_2$.

G. Chapot, A. Hugelin, and J. Verroust (Fac. de Méd., C.H.U. St. Antoine, Lab. de Physiol., Paris, France). *Pflügers Archiv für die gesamte Physiologie*, vol. 287, no. 4, 1966, p. 326-329. 8 refs.

Decrease of temperature raises the action potential of the monosynaptic reflex of the masseter nerve in curarized cats artificially ventilated at a constant level. This augmentation is due to: specific action of temperature and simultaneous variation of alveolar carbon dioxide tension ($PACO_2$). Indeed, decreasing the temperature in an animal artificially ventilated, when ventilation is constant, involves a decreasing $PACO_2$. Interpretation of the stimulus-response curve of the monosynaptic reflex of the masseter nerve allows us to explain the action of decreasing $PACO_2$ by a rise in motoneuron excitability, and the action of decreasing temperature by a rise in action potential of the motoneurons.

A66-81162

AN ANALYSIS OF THE HARVARD STEP-TEST AGAINST THE BACKGROUND OF THE RUNNING TEST AS A CRITERION OF PHYSICAL FITNESS [ANALIZA PROBY HARWARDZKIEJ—STEP-TESTU NA TLE PROBY BIEGOWEJ JAKO KRYTERIUM OCENY WYDOLNOSCI FIZYCZNEJ].

I. Wojcieszak, K. Burkhard, and A. Lisiecki. *Wychowanie Fizyczne i Sport*, vol. 9, no. 4, 1965, p. 389-405. 29 refs. In Polish.

The investigation was carried out on students of the Warsaw School of Physical Education (SPE) and various departments of the University of Warsaw (UW). Its purpose was to analyze physiologically the Harvard test and the running test as a criterion of physical fitness (FI) of the subjects. The results of the investigation showed: (1) The values of the FI index obtained in SPE and UW students indicate the existence of a correlation between this index and the degree of training. (2) Higher values of the pulse rate, the ventilation of the lungs, and oxygen consumption were registered during the Harvard test, and dispersion was smaller in comparison with the running test in which differences in individual execution were noted. This indicates that the Harvard test is more reliable than the running test. (3) The Harvard test may have considerable value in the assessment of the physical fitness of athletes and should be widely employed, provided the method is kept uniform.

A66-81163

FIELD OF VISION AND SIMPLE REACTION TIME DURING RECREATIVE EXERCISES AT WORK [POLE WIDZENIA I CZAS REAKCJI PROSTEJ PRZY ZASTOSOWANIU CWICZEN REKREACYJNYCH W CZASIE PRACY].

T. Mieczkowski and S. Rotenberg. *Wychowanie Fizyczne i Sport*, vol. 9, no. 4, 1965, p. 413-418. 16 refs. In Polish.

Measurements were made of the simple reaction time to sound and light stimuli and the field of vision to different colors in women telephone operators performing and not performing physical exercises during breaks in work. After 5 months the simple reaction time in the exercising group to both stimuli proved shorter than in the non-exercising group. The decrease

in the field of vision to the test colors was also smaller in the exercising group. The practice of physical exercises increased the efficiency of the nervous centers and of the sight analyzer in the brain cortex.

A66-81164

COORDINATION OF THE MOVEMENTS OF EXTREMITIES [ZBORNOSC RUCHOW KONCZYŃ U STUDENTÓW WSWF].

E. Ziobro and M. Golema.

Wychowanie Fizyczne i Sport, vol. 9, no. 4, 1965, p. 491-496. In Polish. The coordination between the movement of upper and lower extremities was examined in 64 students of the School of Physical Education in Wrocław. Each examinee had to draw the sides and the diagonals of a square 25 X 25 cm., separately with each extremity equipped with a drawing instrument. The area of a field enclosed by the lines of a standard square and the area of the field drawn by the examinee were compared. The average error for the upper extremities amounts to 22.6-31.6 sq. cm. and for the lower extremities to 54.2-61.9 sq. cm. The coordination between the lower extremities was higher ($r=0.699$) than between the upper extremities ($r=0.450$). The coordination index between the left extremities was higher ($r=0.618$) than between the right extremities ($r=0.515$).

A66-81165

THE EFFECT OF ACTINOMYCIN 2703 AND THE COMPLEX OF STIMULANTS OF THE SYNTHESIS OF NUCLEIC ACIDS ON THE DEVELOPMENT OF FATIGUE AND STATE OF TRAINING [VLIYANIE AKTINOMITSINA 2703 I KOMPLEKSA STIMULIATOROV SINTEZA NUKLEINOVYKH KISLOT NA RAZVITIE UTOMLENII I TRENIROVANNOSTI].

F. Z. Meerson and L. S. Rozanova (USSR, Acad. of Med. Sci., Inst. of Normal and Pathol. Physiol., Moscow).

Doklady Akademii Nauk SSSR, vol. 166, Jan. 11, 1966, p. 496-499. 14 refs. In Russian.

The effect of actinomycin 2703, which inhibits the synthesis of RNA and the substances which stimulate this synthesis such as folic acid, vitamin B₁₂, and orotic acid, was studied in mice subjected to fatigue by swimming freely in water at 37° C. The animals were trained daily to the point of exhaustion. Groups of animals were given daily 3.3 micrograms of actinomycin 2703 and 0.25 microgram of vitamin B₁₂ intramuscularly, and 0.5 mg. of folic acid and 3 mg. of orotic acid orally. The compounds were given separately or in combination. During the test, which was given every 7-10 days, the animals were forced to swim with a weight (6% of their body weight) attached to their tails, until they began to sink. Injections of actinomycin 2703 lowered the animals' tolerance to fatigue, while introduction of folic acid, vitamin B₁₂, and orotic acid increased the fatigue tolerance. The conclusion may be drawn that fatigue depends on the degree of synthesis of nucleic acids and proteins, which are necessary in the repair of tissue affected by strenuous physiological activity.

A66-81166

INVESTIGATION OF SOME PROPERTIES OF ACTOMYOSIN PROTEINS IN NORMAL RATS AND IN RATS ADAPTED TO HYPOXIA [ISSLEDOVANIE NEKOTORYKH SVOISTV BELKOV AKTOMIOZINOVOGO KOMPLEKSA U NORMAL'NYKH I ADAPTIROVANNYKH K GIPOKSII KRYSI].

Z. I. Barbashova, G. A. Skul'skaya, G. I. Grigoriyeva, and V. V. Vasil'eva (USSR, Acad. of Sci., I. M. Sechenov Inst. of Evolutionary Physiol. and Biochem., Sect. of Resistance Res., Leningrad).

Zhurnal Evolyutsionnoi Biokhimi i Fiziologii, vol. 1, Nov.-Dec. 1965, p. 571-576. 16 refs. In Russian.

In rats adapted to hypoxic conditions, the amount of extractable actomyosin, its specific and characteristic viscosity, the content of SH groups, and resistance to urea denaturation were of the same order, as in control animals which had not been trained to oxygen deficiency. Thus, the enhanced nonspecific resistance of skeletal muscle, previously revealed in hypoxia-adapted animals, cannot be correlated to these properties of actomyosin. Only one of the actomyosin properties considered in this study changed in the rats adapted to hypoxia—the rate of restitution of viscosity (after it had been reduced due to interaction between actomyosin and ATP). Restitution time was prolonged. The underlying mechanism has not been elucidated yet.

A66-81167

REACTION OF STRIATED MUSCLE TISSUE TO HYPOXIA [PRO REAKTSIIU P' PERECHNOSMUHASTOI MIAZVOVI TKANYNY NA HIPOKSIIU].

S. I. Fudel-Ospova, H. O. Rodionov, and V. I. Sevastianov (Acad. of Med. Sci., Inst. of Gerontol., Lab. of Biol. and Lab. of Pathomorphol., Kiev, UkrSSR).

Fiziologichnyi Zhurnal, vol. 12, no. 1, Jan.-Feb. 1966, p. 12-19. 10 refs. In Ukrainian.

Proceeding from the assumption that amitotic division of nuclei of muscle fibers, observed during aging of the organism, is due to hypoxia, the authors conducted experiments which permitted judging of the direct effect of hypoxia on the nuclei of muscle fibers. Hypoxia was evoked by keeping albino rats of various age in a barochamber and by severing the artery supplying blood

to the muscle. Hypoxia of the muscles led to intense amitotic division of nuclei. The reaction of the nuclei was more pronounced in young animals. This is probably due to the fact that in old rats there is a considerable increment in the number of cells. The reaction of muscle tissue to local hypoxia after severing of the artery was relatively less pronounced. The excess of nuclei completely vanished 120 hours after the experiment. The reaction of the organism to hypoxia in the form of intense amitotic division of nuclei should be regarded as an adaptation to the new conditions of existence of the organism during deficiency of oxygen in the environment.

A66-81168

CHANGE IN THE TIGROID SUBSTANCE OF NEURONS UNDER THE EFFECT OF RADIO WAVES [ZMINY TYHROIDNOI RECHOVINY NEIRONIV PID VPLYVOM RADIOKHVYL'].

V. S. Blukrnytskyi (Acad. of Sci., O. O. Bohomolits Inst. of Physiol., Lab. of Biophys., Kiev, USSR).

Fiziologichnyi Zhurnal, vol. 12, no. 1, Jan.-Feb. 1966, p. 70-73. 36 refs. In Ukrainian.

Histological investigation of the functionally different spinal and cerebral neurons was conducted in cats after large doses of radio waves (power flux density $0.4-0.5 \text{ w./cm.}^2$). The animals were treated for one hour and sacrificed immediately afterwards. The material was investigated by Nissi's method. The tigroid substance was in different states, up to completely fused in some neurons. Changes were found in the shape of the neurons, and the state, position and tinctorial properties of the nuclei and nucleoli. The neurons were affected by radio waves to different degrees, depending on the functional properties of the neurons and their ontogeny. For determining the functional state of the neurons from the histological point of view, it is essential to take into account the state, position, and tinctorial properties of the nucleoli in addition to the changes in the state of the tigroid substance and nuclei. The degree of structural changes in the neurons during the action of a superhigh-frequency field on the organism may be a reliable criterion of the injurious effect of radio waves.

A66-81169

EXPERIMENTAL DATA FOR HYGIENIC BASIS FOR MAXIMUM PERMISSIBLE CONCENTRATION OF ETHYLENE OXIDE IN THE ATMOSPHERE [EKSPERIMENTAL'NYE DANNYE K GIGIENICHESKOMU OBOSNOVANIJU PREDEL'NO DOPUSTIMOI KONTSENTRATSII OKISI ETILENA V ATMOSFERE VOZDUKHE].

T. Iuldashev (Central Inst. of Advan. Training of Physicians, Dept. of Communal Hyg., Moscow, USSR and Uzbek Inst. of Sanit., Hyg. and Prof. Diseases, Tashkent, Uzbek SSR).

Gigiena i Sanitariya, vol. 30, no. 10, Oct. 1965, p. 3-7. 7 refs. In Russian.

In order to establish the maximum one-time permissible concentration of ethylene oxide the author determined its threshold value of smell and studied the changes produced in the light sensitivity of eyes and the electric activity of the cerebral cortex. The daily average maximum permissible concentration of ethylene oxide was determined by means of a 24-hour poisoning of albino rats for a period of 83 days. The author selected as tests the general state and weight of the animals, the chronaxy correlation of muscle antagonists, the changes in the concentration of chlorides and residual nitrogen in the whole blood, and the ratio of protein in the blood serum. The maximum one-time permissible concentration of ethylene oxide in the atmosphere is at the level of 0.3 mg./m.^3 and the daily average concentration may be set at a level of 0.03 mg./m.^3 .

A66-81170

THE BLOOD SYSTEM REACTION TO OCCUPATIONAL EFFECT OF VIBRATION AND NOISE [O REAKTSII AKH SISTEMY KROVI NA PROFISSIONAL'NOE VOZDEISTVIE VIBRATSII I SHUMA].

I. A. Gribova and E. A. Solov'eva (USSR, Acad. of Med. Sci., Inst. of Hyg. Labor and Prof. Diseases, Moscow).

Gigiena i Sanitariya, vol. 30, Oct. 1965, p. 34-37. 10 refs. In Russian.

The peripheral blood indices were studied in 436 persons exposed to the action of local vibration and noise. The data obtained are compared with the blood analyses of 550 persons from the control group. In long-term action of local vibration and noise no important change was noted in red blood cells and leucocytic number and differential count. A delay in erythrocytic sedimentation rate was much more pronounced after intensive noise.

A66-81171

HYGIENIC CHARACTERISTICS OF LABOR CONDITIONS IN INDUSTRIAL USE OF ULTRASOUND [GIGIENICHESKAYA KHKARAKTERISTIKA USLOVIV TRUDA PRI PROMYSHLENNOM PRIMENENII ULTRAZVUKA].

Z. Z. Ashbel' (Health Sta. and Sci. Res. Inst. of Hyg. Labor and Prof. Diseases, Gor'ki, USSR).

Gigiena i Sanitariya, vol. 30, no. 10, Oct. 1965, p. 41-46. 15 refs. In Russian.

The parameters of a sound wave field resulting from the use of an industrial ultrasound apparatus were measured. The findings point to the relation of the distribution of the ultrasound wave pressure levels to the type of installation used, the industrial premises dimensions, etc. A group of workers attending the ultrasound units were examined for changes in certain physiological functions (a fall in the auditory sensitivity, an abrupt decrease of the skin resistance to sound, a rise of the amplitude of vertical oscillations of the human body axis, a pronounced fall in the resistance indices). At the same time a decrease of the blood sugar level down to $61-48 \text{ mg.}\%$ was noted. A series of hygienic and sanitary technical recommendations are given for the improvement of labor conditions.

A66-81172

DETERMINATION OF THE TOTAL ABSORBED DOSE IN INTERNAL AND COMBINED IRRADIATION [OPREDELENIE SUMMARNOI POGLOSHCHENNOI DOZY PRI VNUTRENNEM OBLUCHENII].

G. M. Obaturov and A. K. Zabavina.

Gigiena i Sanitariya, vol. 30, no. 10, Oct. 1965, p. 71-78. In Russian.

A method is described, based on a theoretically derived formula, which computes the internal dose received during the exposure of man to radioactive aerosols. The method is considered to be quite exact, with a certain degree of variance in the coefficients used. However, it requires the use of complicated and expensive apparatus.

A66-81173

THE METHOD OF FUNCTIONAL ELECTROENCEPHALOGRAPHY IN THE STUDY OF THE EFFECT PRODUCED BY IMPERCEPTIBLE CONCENTRATIONS OF NOXIOUS SUBSTANCES IN THE HUMAN BODY [K METODIKE FUNKSIONAL'NOI ELEKTROENTSEFALOGRAFII PRI IZUCHENII DEISTVIA NEOSHCHUTIMYKH KONTSENTRATSII VREDNYKH VESHCHESTV NA ORGANIZM CHELOVEKA].

V. A. Chibrikov (Central Inst. of Adv. Training of Physicians, Dept. of Communal Hyg., Moscow, USSR).

Gigiena i Sanitariya, vol. 30, no. 10, Oct. 1965, p. 99-101. In Russian.

A variation of the electroencephalographic method is described for measuring the brain function potential, in which the index of perception of optical stimuli is a more suitable parameter than the total amplitude of the rhythm. It is designed to study the effect of a toxic substance present in the ambient atmosphere in minute amounts. The degree of change in the index is proportional to the effect of the chemical under study. This method is simple and easily applied.

A66-81174

EFFECT OF THE NUMBER OF LAYERS OF CLOTHING ON THE THERMO-INSULATION OF THE HUMAN BODY [VLIYANIE KOLICHESTVA SLOEV ODEZHDI NA TEPLIOZOLIATSIIU ORGANIZMA CHELOVEKA].

R. F. Afanas'eva and L. P. Fedorova (Central Sci.-Res. Inst. Sewing Ind., Moscow, USSR).

Gigiena i Sanitariya, vol. 30, no. 12, Dec. 1965, p. 24-26. In Russian.

The paper contains the findings of an investigation of the efficiency of thermo-insulation of the human body as a whole and that of its separate parts depending on the number of similar layers of the clothing worn. The experiments demonstrated that the thermo-insulation efficiency of various parts of the body are different.

A66-81175

AN APPARATUS FOR DETECTING NOXIOUS ADMIXTURES IN THE AIR BY MEANS OF INDICATOR PAPER [PRIBOR DLA BYSTROGO OPREDELENIYA VREDNYKH PRIMESEI V VOZDUKHE S PRIMENENIEM BREAK-TIVNOI BUMAGI].

G. A. Parsadanian (Armenian SSR, Inst. of Hyg. Labour and Prof. Diseases, Ruzdan).

Gigiena i Sanitariya, vol. 30, no. 12, Dec. 1965, p. 50-51. In Russian.

A fast method for determining the presence of noxious gases in the ambient air utilizes a syringe, a gun, and a three-way stop-cock, enclosed in a box. An indicator paper disk is inserted into the syringe, and the air is drawn through the syringe. The disk is dried, and the intensity of color is compared with the standard.

A66-81176

SPIRO-ERGOMETRIC RESULTS IN TRAINED ATHLETES [RESULTATS SPIRO-ERGOMETRIQUES CHEZ DES SPORTIFS ENTRAINES].

W. van Ganse, J. Stevens, N. Lametre, C. de Sweemer, and K. Vuylsteek (Rijksu. Gent, Lab. voor Hyg. en Soc. Geneeskunde, Belgium).

Internationale Zeitschrift für angewandte Physiologie, vol. 21, no. 2, 1965, p. 99-117. 39 refs. In French.

Fonds Natl. pour la Rech. Sci. supported research.

Oxygen consumption, heart rate, oxygen pulse, respiratory volume, respiratory volume per minute, respiratory rate, and respiratory equivalent (mln. vol./oxygen consumed) were measured in 19 trained male athletes

(cyclists), 18-24 years of age, while performing work on a cyclo-ergometer (50-300 watts) and during a recuperation time of six minutes. During work, an increase was noted in all circulatory and respiratory values except respiratory equivalent which decreased as a reflection of an increase in its two component values. During recuperation, values decreased nearly exponentially except respiratory equivalent which increased to normal values.

A66-81177

EFFECT OF EXERCISE AND TRAINING ON THE BLOOD OF NORMAL AND SPLENECTOMIZED RATS.

P. D. Gollnick, P. J. Struck, R. G. Soule, and J. R. Heinrich (Wash. State U., Dept. of Phys. Educ. for Men, Res. Lab., Pullman). *Internationale Zeitschrift für angewandte Physiologie*, vol. 21, no. 2, 1965, p. 169-178. 46 refs.

The immediate and chronic effects of exercise on hematocrit, hemoglobin, and red cell fragility were studied in splenectomized and sham-operated rats. The training program consisted of an initial 35 minute swim in water at 35° C. The duration of the swim was increased 5 minutes per day until reaching 60 minutes and continued for 42 days. Splenectomy had no effect on organ weights, hemoglobin content, hematocrit, or red cell fragility. The adrenals and heart ventricles of the trained animals were heavier, whereas their livers and spleens were significantly smaller. Training had no effect on percent hemoglobin or hematocrit; however, red cells from trained animals were less resistant to osmotic pressure. No differences in hemoglobin or hematocrits were found between splenectomized and sham-operated animals immediately after exercise. It is concluded that in the rat the spleen does not make a significant contribution to these components of blood during exercise.

A66-81178

PROLONGED ACTION OF PERMISSIBLE PARAMETERS ON THE HEARING OF WORKERS [O DLITEL'NOM DEISTVII SHUMA DOPUSKAEMYKH PARAMETROV NA SLUKH RABOTAIUSHCHIKH].

L. I. Maksimova, P. S. Kublanova, V. P. Malorov, and K. A. Dmitrieva (F. F. Erisman Moscow Sci.-Res. Inst. of Hyg., Moscow, USSR).

Gigiena i Sanitariia, vol. 31, Feb. 1966, p. 11-16. In Russian.

The paper contains the results of an otolaryngological examination of 220 women workers, exposed to the action of noise at an intensity of 80-85 dB, with a maximum level of sound energy at a frequency ranging from 200 to 2000 Hz. Thirty-three persons presented weak hearing for sound intensities of 25-50 dB; in 20 cases the fall of hearing was of occupational origin and was mainly due to frequencies of 3000-6000 Hz. On the basis of their findings the authors conclude that the maximum permissible levels of noise at working sites of industrial enterprises are too high in the field of high-frequency sounds.

A66-81179

CHANGES OF MUSCLE BIOPOTENTIALS IN THE ACTION OF HIGH-FREQUENCY VIBRATION [IZMENENIE BIOPOTENTIALOV MYSHTS PRI VOZDEISTVII VIBRATSII VYSOKIKH CHASTOT].

Z. M. Butkovskaya and Iu. G. Boldyrev (Sci.-Res. Inst. of Hyg. Labor and Prof. Diseases, Leningrad, USSR).

Gigiena i Sanitariia, vol. 31, no. 2, Feb. 1966, p. 16-20. 7 refs. In Russian.

The authors studied the action of sinusoidal high-frequency vibration and vibration of complex spectral composition on the state of hand muscle electric activity. The functional test consisted of a record of biopotentials at the time of static stress of the hand. In the absence of vibration there was a sharp rise of the electric activity of the investigated group of muscles in the course and after static strain. During the action of complex spectrum vibration there were 3 types of reactions: increase, fall, and phasic changes of biopotentials without any noticeable prevalence of any one of the types described. Under the effect of high-frequency vibrations there was a significant fall of the action currents at the time of the effort and after it; the latter affected to some extent the development of inhibition in the corresponding motor nerve centers as the result of action of high-frequency vibration.

A66-81180

FUNCTIONAL AND BIOCHEMICAL CHANGES IN CARDIAC MUSCLE DURING TRAINING [FUNKTSIONAL'NYE I BIOKHMICHESKIE IZMENENIYA V SERDECHNOI MYSHTSE PRI EKSPERIMENTAL'NOI TRENIROVKE].

N. I. Volnov, R. D. Dzhner, V. A. Rogozkin, and Ia. Afar (Sci.-Res. Inst. of Phys. Culture, Leningrad, USSR).

Fiziologicheskii Zhurnal SSSR, vol. 52, no. 2, Feb. 1966, p. 159-165.

12 refs. In Russian.

Electrocardiographic studies in mice showed that training produced adaptation of cardiac muscle to physical work, improved its function, and caused a decrease in normalization period. Systematic training enhanced the oxidative processes in the myocardium, increased the succinate dehydrogenase, increased the amount of nicotinamide-adenine dinucleotide (NAD) and caused the working hypertrophy of the myocardium, which resulted in heart

weight increase. The intake of caseine-hydrolysate, nicotinamide, and inorganic phosphates during training caused an increase in heart size without impairing its functional capacity. Introduction of nicotinamide increased the amount of NAD in the cardiac muscle.

A66-81181

DEGREE OF PERFORMANCE OF THE OPERATOR DURING CONCENTRATION ON FLIGHT CONDITIONS ABOARD SPACECRAFT "VOSKHOD-2" [NEKOTORYE DINAMICHESKIE KHAARAKTERISTIKI OPERATORA PRI SLEZHENII V USLOVIIAKH KOSMICHESKOGO POLETA NA KORABELE "VOSKHOD-2"].

P. I. Beliaev, A. A. Leonov, V. A. Popov, L. S. Khachaturlants, and V. K. Filosofov.

Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 137-143. 12 refs. In Russian.

The effect of various factors on the work performance of a member of an aircrew is discussed, during on-the-ground training and actual space flights. The degree of attention in operating panels and responding to command is correlated with changes of physiological functions, such as pulse rate, respiration rate, and electroencephalogram. During first stages of flight the degree of attention is lower than that of on-the-ground operations. However, as the flight progresses, as during the "Voskhod-2" mission, including Leonov's extravehicular activity, the subject regains the normal ability to observe and report events.

A66-81182

RESULTS OF PRE-FLIGHT AND POST-FLIGHT MEDICAL EXAMINATIONS OF THE SPACECRAFT "VOSKHOD" CREW [REZULTATY PREDPOLETNOGO I POSLEPOLETNOGO MEDITSINSKOGO OBSLEDOVANIYA CHLENOV EKIPAZHA KOSMICHESKOGO KORABLIA "VOSKHOD"].

P. V. Butanov, V. V. Kovalev, V. G. Terent'ev, E. A. Fedorov, and G. F. Khlebnikov.

Kosmicheskie Issledovaniia, vol. 4, no. 1, Jan.-Feb. 1966, p. 151-155. In Russian.

Physical and clinical examinations of the astronauts who took part in the Soviet spacecraft "Voskhod" mission revealed certain changes in their body physiology after the mission. The subjects showed a decrease in working capacity and muscle tonus, instability in Romberg position, hand tremor, increased sweating and pulse rate, and lower diastolic pressure. The loss of body weight was 2.6-4%. Clinical laboratory tests revealed a higher basal metabolism rate and a high concentration of blood cholesterol and urea. The urinary excretion of nitrogenous compounds was also increased. The leukocyte phagocytic power was lower than normal. The changes were thought to be caused by the fatigue and stress, and normalization occurred within a few days. The effect varied with individuals and with the type of pre-flight training.

A66-81183

EFFECT OF SPACE FLIGHT FACTORS ON MICROSPORES OF TRADESCANTIA PALUDOSA ABOARD SPACECRAFT "VOSKHOD" [VLIANIE FAKTOROV KOSMICHESKOGO POLETA NA KORABELE-SPUTNIKE "VOSKHOD" NA MIKROSPORY TRADESCANTIA PALUDOSA].

N. L. Delone, B. B. Egorov, and V. V. Antipov.

Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 156-161. In Russian.

The stems and inflorescence of *Tradescantia paludosa* were placed in special containers on board the Soviet spacecraft "Voskhod". Samples of sporangia were taken for microscopic study 1.5 hr. before landing, and 2 hrs. 15 min., 24, 48, and 120 hrs. after landing. The effects of space flight factors on the reorganization of chromosomes, and on the disturbance in the mechanisms of mitosis were studied. There were variations in the results. The phases most sensitive to chromosomal reorganization were middle and late prophase, the least sensitive was early interphase. In regard to number of cells with disturbance of mitosis, the most sensitive was the late interphase. The conclusion was reached that one group of factors affected the chromosome reorganization, and different factors produced the disturbance in the mechanism of mitosis.

A66-81184

BIOLOGICAL MODEL FOR THE STUDY OF THE SUBLETHAL DOSE OF PROTON RADIATION [MODELIROVANIE BIOLOGICHESKOGO EFFEKTA GLUBINNOI DOZY MONOENERGETICHESKOGO POTOKA PROTONOV].

V. S. Morozov, V. S. Shashkov, and B. I. Davydov.

Kosmicheskie Issledovaniia, vol. 4, Jan.-Feb. 1966, p. 172-174. 6 refs.

In Russian.

In order to study the relative biological effect of proton radiation in different parts of the body, two groups of mice were used. One group received, 15-20 minutes before the exposure to radiation, intraperitoneal injections of the radiation protective substance aminoethyl-isothioronium bromide (AET) at 150 mg./kg. body weight. The animals were placed in parallel rows, perpendicular to the axis of the monochromatic beam of 120-Mev protons. The

total dose was equal to 1,600 rad, with intensity of 50 rad/min. The percentage of the number of survivors within 30 days after the exposure, and the average life duration of these animals showed that the animals further away from the radiation source, that is, those which received radiation filtered through the bodies of other animals, received a smaller amount of radiation. The effect of AET was noted only in animals closer to the radiation source. The survival number in the last rows did not indicate any substantial difference between drug protected and control animals.

A66-81185

EFFECT OF OPERATING A CONTROL PANEL ON PHYSIOLOGICAL FUNCTION OF MOTOR APPARATUS [O VLIANII RABOTY ZA PUL'TOM UPRAVLENIIA NA NEKOTORYE POKAZATELI FUNKTSIONAL'NOGO SOSTOYANIYA DVIGATEL'NOGO APPARATA].
G. I. Oksengendler.

Gigiena i Sanitariya, vol. 31, Jan. 1966, p. 35-38. 18 refs. In Russian.

Physiological changes in operators working on control panels were studied. Under the influence of day and night work there occurred in these specialists functional changes of the kinesthetic analyzer. These shifts reflected the development of fatigue manifested by a weakened process of internal inhibition in the cortical layer of the motor analyzer, its regulating influence on the state of peripheral structures and motor spheres, as well as alterations of coordination ratios between the motor centers. The physiological indices of day and night studies did not differ essentially, this, apparently, being the result of a certain alteration of the daily rhythm of physiological functions in prolonged adaptation to night work.

A66-81186

USE OF MISHCHUK APPARATUS FOR DETERMINING HEAT LOSS IN PERSPIRATION [ISPOL'ZOVANIE PRIBORA MISHCHUKA DLYA OPREDELENIYA TEPLOOTDACHI ISPARENENIYA POTIA].

G. A. Antropov and N. S. Smirnitkii (F. F. Erisman Moscow Sci.-Res. Inst. of Hyg., Moscow, USSR).

Gigiena i Sanitariya, vol. 31, Jan. 1966, p. 53-56. 8 refs. In Russian.

The Mischuk apparatus was used for determining the amount of perspiration in quantitative units in the study of heat loss from the skin during sweating. The subjects were placed in an air-conditioned chamber at 18-32°C, with a relative humidity of 20-80%. The amount of perspiration was estimated by weighing the subjects before and after the experiment. The values obtained were correlated with the skin electrical resistance. Charts and graphs of the results are given.

A66-81187

IMMUNOLOGICAL RESPONSE OF THE BODY ON THE ACTION OF SMALL CONCENTRATIONS OF BENZENE [OB IMMUNOLOGICHESKOEI REAKTIVNOSTI ORGANIZMA PRI VOZDEISTVII MALYKH KONTSENTRATSII BENZINA].

G. M. Mukhametova (Sci.-Res. Inst. of Hyg. and Prof. Diseases, Ufa, USSR).
Gigiena i Sanitariya, vol. 31, no. 1, Jan. 1966, p. 106-108. In Russian.

Mice exposed to benzene vapors (3 mg./l.) 4 hrs. per day for 4 months did not show any change in phagocytic activity, when challenged with a pathogenic *Salmonella*. A longer period of exposure to benzene vapors disclosed a loss of phagocytic action of the leucocytes, and a reduced rate of antibody formation. It may be concluded that chronic exposure to benzene vapors in small concentrations could result in lowering the body's resistance to infections.

A66-81188

POSSIBILITY OF USING QUANTITATIVE DNA COMPOUNDS TEST OF URINE FOR SELECTION OF RADIOPROTECTORS [O VOZMOZHNOSTI ISPOL'ZOVANIYA OPREDELENIYA OBSHCHEGO KOличESTVA DISHE-POLOZHITEL'NYKH SOEDINENII V MOCHE DLYA OTBORA RADIOPROTEKTOROV].

S. A. Davydova, V. M. Dorofeev, and V. G. Iakovlev,
Radiobiologiya, vol. 6, no. 1, 1966, p. 93-96. 17 refs. In Russian.

Twenty-one known radioprotective compounds were tested in order to establish a correlation between the radioprotective power of a compound and its ability to lower urinary excretion of the deoxyribonucleic acid containing (Dische-positive) substances. Rats were exposed to 700 r of CO^{60} radiation (intensity 200-250 r/min.). The controls received injections of physiological saline solution. The experimental animals were given the radioprotective compounds at the established radioprotective doses. In control animals, radiation caused a 58% increase in urinary Dische-positive compounds. In the experimental animals, no correlation was noted between the protective action and the amount of excretion of Dische-positive substance. This method, therefore, cannot be used to select the most effective radioprotectors. It is concluded that the excretion of Dische-positive compounds is not a specific measure of ionizing radiation injury.

A66-81189

RADIOPROTECTIVE ACTION OF INERT GASES AND LOW-MOLECULAR NARCOTICS. V. RADIOPROTECTIVE EFFECT OF LOWER MONOHYDRIC ALCOHOLS IN X-IRRADIATION OF BEAN SPROUTS [PROTIVOLUCHEVOE DEISTVIE INERTNYKH GAZOV I NIZKOMOLEKULARNYKH NARKOTIKOV. 5. ZASHCHITNYI EFEKT NIZSHKIH ODNOATOMNYKH SPIRTOV PRI RENTGENOVSKOM OBLUCHENII PROPOSTKOV BOBOV].

V. P. Paribok and E. I. Genter (USSR, Acad. of Sci., Inst. of Cytol., Leningrad).
Radiobiologiya, vol. 6, no. 1, 1966, p. 97-100. 19 refs. In Russian.

Bean sprouts were immersed for 2 hrs. in solutions of monohydric alcohols before exposure to X-rays. A non-toxic concentration of each alcohol was used, that is, 6%, 5%, and 1% for methyl, ethyl, and propyl alcohol, respectively. The radiation doses utilized were between 50 and 800 r. Methyl and ethyl alcohols showed protective action when irradiation was conducted in the air or in pure oxygen. Methyl alcohol was effective also in an atmosphere containing nitrogen oxide. Rinsing in water after treatment removed the protective power. The monohydric alcohols were effective also at low temperatures. The mechanism of protection of the alcohols seems to be different from that of inert gases.

A66-81190

CONCENTRATION OF OXYGEN IN TISSUES IN BARBAMILE NARCOSIS (ON THE PROBLEM OF THE MECHANISM OF RADIOPROTECTIVE ACTION OF BARBAMILE) [O KONTSENTRATSII KISLORODA V TKANIAXH PRI BARBAMILOVOM NARKOZE].

R. B. Strelkov and O. I. A. Vorob'ev (USSR, Acad. of Med. Sci., Inst. of Exptl. Pathol. and Therapy, Sukhumi).

Radiobiologiya, vol. 6, no. 1, 1966, p. 109-111. 18 refs. In Russian.

A method of polarography was employed to study the effect of barbamil (a barbiturate) anesthesia on the oxygen content of spleen and other organs in rats. Intraperitoneal injection of barbamil, 75 mg./kg. body weight, caused an elevation of oxygen concentration in spleen tissues. A decrease of pulmonary ventilation, due to anesthesia, with a constant partial tension of oxygen, did not lower the oxygen content of spleen and liver tissues. This fact suggests that the mechanism of radioprotection by barbamil is independent of the oxygen effect, and most likely it affects the central nervous system and functions regulated by this system.

A66-81191

ACTION OF RADIOPROTECTORS UNDER THE CONDITIONS OF FRACTIONATED IRRADIATION. III. ESTIMATION OF EFFECTIVENESS OF VACCINE PROPHYLAXIS IN REPEATED RADIATION EXPOSURE [DEISTVIE PROTIVOLUCHEVYKH SREDSTV V USLOVIYAKH FRAKTSIONIROVANNOGO OBLUCHENIIA. 3. OTSENKA EFEKTIVNOSTI VAKTSINNOI PROFILAKTIKI PRI PROLONGIROVANNOM RADIATSIONNOM VOZDEISTVII].

O. G. Alekseeva, E. I. Lavrenchik, and S. P. Iarmonenko (USSR, Acad. of Med. Sci., Inst. of Hyg. Labor and Prof. Diseases, Moscow).
Radiobiologiya, vol. 6, no. 1, 1966, p. 112-114. 13 refs. In Russian.

Immunization of mice with the BCG vaccine two weeks prior to a single exposure to X-ray radiation (850-880 r) produced a mild radiation protection effect, which was expressed in a greater number of surviving animals (about 15%), but had no effect on the gravity of the radiation sickness. However, immunization produced no effect when the irradiation was repeated four times, 300 r every 48 hrs., with a total dose of 1200 r, or when the animals were injected intraperitoneally with P32 (10-20 microcuries per kg. of body weight). The intraperitoneal injections of 7 mg. of AET (aminoethylthiourea dithiomethylate) or Cytophos (sodium-aminoethyl-phosphate), 10-15 min. before the repeated irradiation, resulted in 63% and 56% survival, respectively, as compared with control (4%). The immunized animals, which received the same radioprotectors showed a greater rate of survival, 68% and 63%, respectively.

A66-81192

PHYSIOLOGICAL RESPONSES OF COSMONAUTS IN STATE OF WEIGHTLESSNESS [FIZIOLOGICHESKIE REAKTSII KOSMONAVTOV V BEZOPORNOM PROSTRANSTVE].

I. I. Kas'tan, I. A. Kolosov, V. I. Kopanov, and V. I. Lebedev.
Izvestia Akademii Nauk SSSR, Seriya Biologicheskaya, vol. 31, Jan.-Feb. 1966, p. 3-13. 7 refs. In Russian.

Physiological responses of cosmonauts P. I. Beliaev and A. A. Leonov to a weightless state were studied during short-term experiments and compared with the data obtained during the flight of the Voshkod-2 spacecraft. During his extravehicular excursion A. A. Leonov, remaining tethered, showed no appreciable impairment in his motor coordination, ability to orientate himself, or perform assignments. It should be noted that the development of precisely coordinated movements of cosmonauts for extravehicular excursions required preliminary training (4-8 flights) under simulated weightlessness. The tendency of physiological changes of the two cosmonauts is similar to that exhibited by other Soviet cosmonauts during their

training. The changes involve: (1) an increase of the pulse and respiration rate and a rise of the blood pressure during exposure to accelerations; (2) a gradual decrease of the above indices during a repeated exposure to weightlessness or its long-term effects; (3) a reduction of the post-rotational nystagmus and counter-rotation illusion during weightlessness; (4) insignificant changes in the function of the motor analyzer.

A66-81193

SOME PROBLEMS OF THE DEVELOPMENT OF AN OPTIMAL ACOUSTIC ENVIRONMENT FOR THE MANNED SPACECRAFT [NEKOTORYE VO-PROSY FORMIROVANIYA OPTIMAL'NOI AKUSTICHESKOI SREDY V KABINAKH KOSMICHESKIKH KORABLEI].

E. M. Iuganov, I. V. Krylov, and V. S. Kuznetsov. *Izvestia Akademii Nauk SSSR, Seriya Biologicheskaya*, vol. 31, Jan.-Feb. 1966, p. 14-20. 20 refs. In Russian.

The problem of habitability of the manned spacecraft designed for long duration missions cannot be solved without an establishment of permissible limits of noises affecting the crew. Experiments have shown that a sustained 30-day exposure to noises totalling 60-65 dB. can be considered permissible. It is pointed out that an establishment of the minimal threshold of acoustic stimuli is urgent. To prevent an adverse psycho-acoustic effect of the monotonous noise it is recommended to change the range of its amplitude and frequency, maintaining constant the level of its loudness which, as calculated, should not exceed 58-60 phon.

A66-81194

CHANGES IN THE CARDIAC ACTIVITY AND RESPIRATION OF THE COSMONAUTS DURING THE ORBITAL FLIGHT OF VOSKHOD-1 SPACECRAFT [IZMENENIYA SERDECHNOI DEIATEL'NOSTI I DYKHANIYA U KOSMONAVTOV PRI LEGKOI FIZICHESKOI NAGRUZKE VO VREMIA ORBITAL'NOGO POLETA NA KOSMICHESKOM KORABLE "VOSKHOD-1"]. A. D. Voskresenski, I. I. Kas'tan, and D. G. Maksimov. *Izvestia Akademii Nauk SSSR, Seriya Biologicheskaya*, vol. 31, no. 1, Jan.-Feb. 1966, p. 21-28. 11 refs. In Russian.

When performing light work with a dynamometer, the cosmonauts-V. M. Komarov, K. P. Feoktistov and B. B. Egorov—showed a slight increase of the pulse and respiration rate. The phenomenon can be regarded as a result of the trigger effects of the nervous system during the onset of accelerations and subsequent adaptation of circulation and respiration to higher oxygen requirements. When working, V. M. Komarov and K. P. Feoktistov exhibited less variability of the R-R interval and shorter duration of respiratory cycles. This is an evidence of the normalizing effect of a light physical load upon the regulation of the cardiac activity and respiration during weightlessness. While doing exercises, B. B. Egorov showed greater variability of the R-R interval. An analysis of the pneumogram revealed periods of tachypnea with a decrease of the duration of the respiratory cycle down to 2 sec. An analysis of the dynamogram showed symptoms of rapid fatigue. Peculiarities of the response of B. B. Egorov can be associated with the feeling of discomfort due to illusory perception of the body position, though conceptually a direct effect of weightlessness upon the function of external respiration cannot be excluded.

A66-81195

VESTIBULAR REACTIONS OF THE DEAF UPON EXPOSURE TO ANGULAR AND CORIOLIS ACCELERATIONS [VESTIBULIARNYE REAKTSII U GLUKHIKH PRI VOZDEISTVII UGLOVYKH I KORIOLISOVYKH USKORENI]. S. S. Markarian.

Izvestia Akademii Nauk SSSR, Seriya Biologicheskaya, vol. 31, Jan.-Feb. 1966, p. 29-36. 19 refs. In Russian.

In a group of deaf patients, during cumulative action of Coriolis accelerations for 20 min., the subjects who had their eyes closed did not have illusory sensations of motion sickness, vertigo, or nausea. When exposed to Coriolis and radial accelerations the subjects with head bent and eyes open developed no vertigo, nausea, or illusory perception of displacement. They could take the readings quite well. Upon an abrupt cessation of rotation, the patients had no illusion of counter-rotation or of displacement of the instruments and corresponding readings. During a repeated exposure to positive and negative accelerations ranging from 60 to 240 deg./sec.² the deaf subjects had no sensations of vertigo and nausea. They did not complain that instruments or readings flickered before their eyes. They exhibited no nystagmus when exposed to the above accelerations of every direction. The studies demonstrate that the body of the deaf devoid of the vestibular function does not respond to the action of angular and Coriolis accelerations. This is evidence of a simultaneous damage of otolithic and ampullar receptors.

A66-81196

RELATIONSHIP OF THE END-TIDAL CO₂ TENSION DURING WORK TO PHYSICAL CAPACITY [BENZIEHUNGEN DER ENDESPIRATORISCHEN CO₂-SPANNUNG BEI ARBEIT ZUR KÖRPERLICHEN LEISTUNGSFÄHIGKEIT].

Karlheinz Kessler (Bonn U., Physiol. Inst., West Germany). (*Am. Physiol. Soc., 17th Autumn Meeting, Los Angeles, Aug. 23-27, 1965*). *Pflügers Archiv für die gesamte Physiologie*, vol. 287, no. 2, 1966, p. 176-196. 80 refs. In German.

End-tidal carbon dioxide tension was measured in three athletes and five untrained subjects during graded physical stress to the point of exhaustion. Depending upon the work load and training condition, measurements showed initially rising and later falling carbon dioxide tensions. Higher end-tidal carbon dioxide tension values and the subsequent drop occurred at higher levels of physical load with better training of the individual. There was a linear relationship between the logarithm of the alveolar ventilation and physical work load expressed in watts, whereby the slope angle of the rising curve became smaller with increasing physical capacity. Also, a close linear relationship was found for all subjects between the alveolar ventilation and the respiratory minute volume independent of the work load and training level. Contradictory findings by other authors are discussed.

A66-81197

THE POSSIBLE MECHANISMS OF THE STIMULATION OF HEMOPOIESIS UNDER REDUCED BAROMETRIC PRESSURE.

Melita Terzioğlu (Istanbul U., Fac. of Med., Inst. of Physiol., Turkey). (*Proc. of the Intern. Symp. on Impact of Basic Sci. on Med., Jerusalem, Israel, Jun. 21-28, 1965*).

Israel Journal of Medical Sciences, vol. 1, Nov. 1965, p. 1295-1303. 20 refs.

Unilaterally and bilaterally denervated rabbits were subjected to an environmental pressure of 400 to 410 mm. Hg for 6 hr. daily, for a total of about 200 hr. It took about a week for the bilaterally denervated rabbits to be acclimated to this lowering of environmental pressure. These subjects indicated the onset of an intense polycythemia and an increase in percentage of hematocrit, hemoglobin concentration, and oxygen capacity. These various parameters reached a maximum after about 120 to 150 hr. of exposure to reduced pressure and then came to a near standstill. The reticulocyte count, on the other hand, attained the highest peak within 50 to 100 hr. and then gradually declined to normal values. The reaction of the hematopoietic tissues of the unilaterally denervated rabbits to intermittent low pressure was not as marked as that of the bilaterally denervated ones. These results clearly demonstrated that the acclimatization of chemoreceptorless animals to reduce barometric pressure is by stimulation of hematopoiesis. Attempts to determine and explain the mechanism involved were unsuccessful.

A66-81198

STUDIES ON THE PHYSIOLOGICAL RELATIONSHIP BETWEEN RETINA AND LABYRINTH.

Felix Bergmann and A. Costin (Hebrew U.-Hadassah Med. School, Dept. of Pharmacol., Jerusalem, Israel).

(*Proc. of the Intern. Symp. on Impact of Basic Sci. on Med., Jerusalem, Israel, Jun. 21-28, 1965*).

Israel Journal of Medical Sciences, vol. 1, Nov. 1965, p. 1366-1375. 15 refs.

Experiments revealing a certain parallelism in the reactions following vestibular or retinal stimulation in the rabbit are reported. Each organ inhibits the response elicited from the contralateral companion. In addition, optic nystagmus to the right is inhibited by appropriate stimulation of the left labyrinth and vestibular nystagmus to the right by illumination of the left retina. To enable the brain to use vestibular and retinal stimulations for delicate adjustments of body equilibrium, a system of mutual inhibitions has evolved which helps in minimizing nystagmus movements under normal circumstances. It is unlikely that nature can provide the special conditions required to evoke nystagmus in intact animals. On the other hand, permanent illumination, adequate for photic inhibition, is available most of the time. Similarly, gravitation may have an important function in the suppression of nystagmus responses, although final evaluation of this factor is not yet possible.

A66-81199

THE ROLE OF CATECHOLAMINES IN COLD ADAPTATION.

Loren D. Carlson (Ky. U., Med. Center, Dept. of Physiol. and Biophys., Lexington).

(*Second Catecholamine Symp., Milan, Italy, Jul. 4-9, 1965*).

Pharmacological Reviews, vol. 18, Mar. 1966, p. 291-301. 41 refs.

A review is presented of various physiological responses to catecholamines occurring in man and animals during cold adaptation. Included are metabolic effects, blood levels of catecholamines, organ and tissue effects, and circulatory effects. Catecholamine responses in chronic exposure to cold unfold fascinating questions from the biochemical to the control systems level. There are ontogenetic and phylogenetic aspects of the problem. Activation of the regulatory nonshivering thermogenesis by exposure to cold makes use of sympathetic pathways. A thermal benefit is accompanied by a circulatory shift to maximize the role of the body shell in insulation. Possible metabolic pathways exist and peripheral (nonvisceral) adipose tissue may serve as the site of heat production although mechanisms within muscle tissue may not be excluded.

A66-81200

EFFECT OF COLD ON METABOLIC USE OF LIPIDS.

E. J. Masoro (Pa., Women's Med. Coll., Dept. of Physiol., Philadelphia). *Physiological Reviews*, vol. 46, Jan. 1966, p. 67-101. 165 refs. USAF and NIH supported research.

The ways in which cold exposure alters lipid metabolism are reviewed, and the role which lipids play in enabling the homeotherm to live at low environmental temperatures is considered. The marked depletion of body fat on initial exposure to cold is accompanied by a rise in plasma free fatty acid (FFA) levels. The changes in body fat content and FFA levels are apparently the result of an activated mobilization of adipose tissue triglyceride, triggered by the sympathetic nervous system. When cold-acclimated, the animal is usually not mobilizing its adipose tissue triglyceride reserve, but maintains an ability to do so when conditions require. Resistance to ketosis in cold-acclimated animals appears to be related to an enhanced capacity of the liver and possibly other tissues to oxidize fatty acid to carbon dioxide and water. In cold-induced nonshivering thermogenesis, there is evidence for the increased utilization of protein, carbohydrate, and fat, without any evidence that one is the preferred fuel. Brown adipose tissue appears to play a role in heat production in newborn animals and in hibernators.

A66-81201

HUMAN CIRCADIAN RHYTHMS.

J. N. Mills (Manchester U., Dept. of Physiol., Great Britain).

Physiological Reviews, vol. 46, Jan. 1966, p. 128-171. 253 refs.

In man, circadian rhythms are not present at birth, but they develop during the first year of life. The spontaneous rhythm, at first different from 24 hours, becomes gradually entrained to a 24-hour day. Rhythms of wakefulness, psychomotor performance, breathing, temperature, cardiovascular system, adrenal cortex, kidney, hematology, mitotic activity, pituitary gland, metabolic enzymes, parasites, and pathology are examined. Although many human functions show circadian rhythmicity, it is often difficult to determine whether they are endogenous or impressed by external rhythm of habit or environment. There is, however, a circadian clock, which is tentatively placed in the region of the hypothalamus.

A66-81202

THE WORLD OF SILENCE: CLINICAL EVALUATION OF HEARING LOSS.

Kedar K. Adour (Lahey Clinic Found., Inc., Dept. of Otolaryngol., Boston, Mass.). *Lahey Clinic Foundation Bulletin*, vol. 14, 1965, p. 121-130.

Hearing loss may be conductive, sensorineural (perceptive or nerve), or mixed (combined conductive-sensorineural). Methods and reliability of hearing acuity tests for both bone and air conduction are described. Five conditions leading to conductive hearing loss and the most common type of sensorineural hearing loss are examined.

A66-81203

ON THE NATURE OF MIXED CULTURES OF CHLORELLA PYRENOIDOSA TX 71105 AND VARIOUS BACTERIA.

G. R. Vela and Cleste N. Guerra (USAF School of Aerospace Med., Brooks AFB, Tex.).

Journal of General Microbiology, vol. 42, Jan. 1966, p. 123-131. 18 refs. NASA and USAF School of Aerospace Med. supported research.

The growth of several selected micro-organisms in rapidly dividing cultures of *Chlorella pyrenoidosa* TX 71105 was studied. Bacterial proliferation was a function of algal growth and bacterial growth occurred, at least in part, as a result of the excretion of organic substances into the culture medium by rapidly dividing algae. These substances capable of supporting bacterial oxidation and growth were varied in kind and were utilized selectively by the different bacteria. Only a small fraction of the soil and air bacteria grew in the algal cultures. The majority of soil and air bacteria survived in mixed cultures for several days but did not increase in numbers. On the other hand, 6 out of 8 bacteria pathogenic for man died promptly in cultures of *Chlorella pyrenoidosa*; but *Salmonella typhi* and *S. paratyphi* grew well for extended periods of time. Fungi capable of producing macrocolonies on potato glucose agar at pH 3.5 did not increase in numbers during 8 days. Yeasts and actinomycetes were not detected by the methods used; bacteriophages were observed with some regularity.

A66-81204

FABRICATION OF SUCTION-CUP ELECTRODES FOR ELECTROMYOGRAPHY.

J. C. Moore (Mich. U., Med. School, Dept. of Anat., Ann Arbor).

Electroencephalography and Clinical Neurophysiology, vol. 20, Apr. 1966, p. 405-406.

Directions for fabricating an inexpensive surface suction-cup electrode for use in electromyogram are given. This type of electrode can be placed on an exact location on the skin very quickly and easily without the use of adhesives or tapes. This suction cup has proven itself to be a useful tool in preliminary investigations of muscle action potentials.

A66-81205

AN IMPLANTED ELECTRODE FOR RECORDING BOTH RAPID EYE MOVEMENTS AND MUSCLE TONE DURING SLEEP.

Richard B. Yules, John A. Ogden, Frederick P. Gault, and Daniel X. Freedman (Yale U., School of Med., Depts. of Psychiat. and Anat., New Haven, Conn.). *Electroencephalography and Clinical Neurophysiology*, vol. 20, Apr. 1966, p. 410-411.

Grants PHS MH 07075, K3-18566, and M1463.

A single electrode pair which permits recording of both cephalic muscle tone and rapid eye movements (REM) in cats is described. Use of this method for recording from sleeping animals provides the use of fewer recording channels, a method for accurately monitoring the REM state, and an easy means of comparing REM with cephalic muscle tone.

A66-81206

RESULTS OF EXAMINATION OF OCCUPATIONAL HAZARDS IN A GROUP OF RADIO-OPERATORS [REZULTATI ISPITIVANJA PROFESIONALNIH OSTECENJA KOD JEDNE GRUPE RADIO-TELEGRAFIŠTA].

Dragoljub Petrović (Vojnomed. Akad., Beograd, Yugoslavia). *Vojnosanitetski Pregled*, vol. 23, Feb. 1966, p. 87-91. 25 refs. In Serbo-Croatian.

A group of radio operators who were working with radio receivers and teleprinters were examined and compared with a control group not exposed to any harmful effects. Each group consisted of 93 persons quite homogeneous in composition, who had been working at the job for about 8.5 years. In the exposed group, the noise level in high frequencies reached the critical limits of hazards for health. The harmful effects, other than noise, were the psychological strain provoked by constant concentration of attention, the quick transfer of attention from one subject to another, and the emotional tension caused by the responsibilities related to the job.

A66-81207

SOME EXPERIMENTS IN THE CHEMISTRY OF NORMAL SLEEP.

Ian Oswald (Western Australia U., Nedlands), G. W. Ashcroft, D. Eccleston, J. I. Evans (Edinburgh U., Great Britain), R. J. Berger, (Calif. U., Brain Res. Inst., Los Angeles), and V. R. Thacore (Mappertly Hosp., Nottingham, Great Britain).

British Journal of Psychiatry, vol. 112, Apr. 1966, p. 391-399. 37 refs. Med. Res. Council supported research.

Upon falling asleep there is normally a delay of at least 45 minutes of orthodox ("slow wave") sleep before the onset of paradoxical sleep (rapid eye movement phase). Laevo-tryptophan, 5 to 10 g. orally upon retiring, resulted in delays of less than 45 minutes in 5 of 16 normal young male adults, of whom three were studied in detail and among whom no evidence of unusual tryptophan absorption or metabolism was found. Control amino-acids, tyrosine, and methionine did not produce the response. It is postulated that the effect on sleep results from the metabolism or tryptophan to 5-hydroxytryptamine (serotonin). Further results described support this hypothesis, particularly the fact that the specific anti-serotonin agent, methysergide, prevented the effect of tryptophan.

A66-81208

ASTM: WORK PROCEEDING ON SPACE SIMULATION STANDARDS.

Samuel F. Etris and Rodney W. Johnson.

Environmental Quarterly, vol. 12, Mar. 1966, p. 36-37.

Am. Soc. for Testing and Mater. supported research.

An overview of the current activities of the American Society for Testing and Materials is presented. The areas of space simulation, high modulus fibers, fracture testing of metals, refractory metals, refractory-metal coatings, pyrolytic materials, advanced graphite materials, contamination, and biological deterioration of materials are being investigated to meet the challenges of man-in-space and man-in-deep-sea. Safety procedures, equipment, and materials for man-in-vacuum are being stressed, and methods of measuring high-energy and thermal radiation are being perfected.

A66-81209

THE BIOLOGY OF RESPIRATION.

Victor Negus (King's Coll., London, Great Britain).

Baltimore, The Williams and Wilkins Co., 1965, xi+228 p. 98 refs. \$12.00.

Respiratory functions and mechanisms in water and in air are extensively compared in animals (from amoebae to humans) and in plants. Whether in air or water, the factors to be considered are the supply of air or water, the regulation of entry and exit, conveyance to and diffusion through the diffusing membrane, transport of oxygen to and carbon dioxide from the tissues, and tissue metabolism.

A66-81210

ALTITUDE AND RHEUMATIC FEVER IN COLORADO.

William E. Morton (Colo. Dept. of Public Health and Colo. U. Med. Center, Denver).

American Journal of Epidemiology, vol. 83, Mar. 1966, p. 250-254. 19 refs. Colo. Heart Assn. and Colo. Dept. of Public Health supported research.

In Colorado there is a consistent absence of evidence that altitudes between 3,500 and 10,150 feet directly affect the risk of rheumatic fever mortality, rheumatic heart disease prevalence, and rheumatic heart disease mortality. The possibilities of indirect altitude related effects or of threshold effects at about 3,000 and/or 8,000 feet have not been excluded.

A66-81211

TREATMENT OF FRACTURES OF THE LOWER QUARTER OF THE TWO DIAPHYSES OF THE LEG (A PROPOS DU TRAITEMENT DES FRACTURES DU QUART INFERIEUR DE LA DIAPHYSE DES DEUX OS DE LA JAMBE).

M. Anne and G. Rivot.

Société de médecine militaire française, vol. 60, Mar. 1966, p. 143-147. In French.

The manner of treating the fractured tibia and fibula of seven parachutists by costal graft is described. The graft is encased in a plaster cast for several months.

A66-81212

RESPIRATOR COMFORT: SUBJECTIVE RESPONSE TO FORCE APPLIED TO THE FACE.

S. H. Snook, W. C. Hinds, and W. A. Burgess (Harvard U., School of Public Health, Boston and Liberty Mutual Insurance Co., Hopkinton, Mass.) (*Am. Ind. Hyg. Assn.*, 26th Ann. Meeting, Houston, Tex., May 6, 1965). *American Industrial Hygiene Association Journal*, vol. 27, Mar.-Apr. 1966, p. 93-97.

Grants PHS AP 00259-01 and 02.

The force that a respirator facepiece exerts against the face was investigated as a factor in respirator discomfort. An experiment was designed to test the hypothesis that some locations on the face are more sensitive to force than other locations. Twelve facial locations were selected and subjected to five different forces (0.363, 0.510, 0.726, 1.020, and 1.599 megadynes). On the basis of psychophysical measurements obtained from 12 subjects, it is concluded that facial locations differ in sensitivity to force, but that these differences are not significant enough to warrant any major changes in respirator facepiece design.

A66-81213

EMERGENCY EXPOSURE LIMITS.

J. P. Frawley, K. H. Jacobson, J. C. Calandra, W. G. Fredrick, D. B. Hood, M. L. Keplinger, E. D. Palmes, H. E. Stokinger, T. R. Torkelson, J. F. Treon, M. H. Weeks, C. S. Weil, and N. G. White. *American Industrial Hygiene Association Journal*, vol. 27, Mar.-Apr. 1966, p. 193-195. 16 refs.

Emergency limits for human exposure to pentaborane-9 are listed as: 25 p.p.m. (85 mg./m.³), 5 min.; 8 p.p.m. (21 mg./m.³), 15 min.; 4 p.p.m. (10 mg./m.³), 30 min.; 2 p.p.m. (5 mg./m.³), 60 min. Exposure for one min. at 1000 p.p.m. causes convulsions in many, and death in a few men. The onset of symptoms after borane exposure varies from immediate to 24-hr. delay. Initial symptoms are lightheadedness, drowsiness, headache, severe fatigue, or muscle spasms.

A66-81214

INFLUENCE OF A DIET HIGH IN UNSATURATED FAT UPON COMPOSITION OF ARTERIAL TISSUE AND ATHEROMATA IN MAN.

Seymour Dayton, Sam Hashimoto, and Morton Lee Pearce (Calif. U., School of Med., Dept. of Med., Veterans Admin. Center, Res. Serv., and Wadsworth Hosp. and Domiciliary, Med. Serv., Los Angeles). *Circulation*, vol. 32, Dec. 1965, p. 911-924. 31 refs. Grants PHS HE-03734, HE-04900, and Los Angeles County Heart Assn. 241; Arthur Dodd Fuller Found. supported research.

Detailed chemical analyses of aorta and coronary and aortic atheromata were carried out and compared in men who died during a study of prolonged use of diets rich in unsaturated fats and in control subjects. Concentrations of total aortic lipid and of total aortic calcium were not significantly different for the two groups of subjects. Concentrations of cholesterol and cholesterol esters, triglyceride, and phosphatide showed no difference between the two groups. Atheroma triglyceride in experimental subjects contained more linoleic acid than in control subjects, in all types of plaques.

A66-81215

WORK SPEED AS A MEASURE OF AN EQUIVALENT EXERCISE STRESS IN SUBJECTS OF DIFFERENT WEIGHTS.

B. van Lingen, P. D. Seaward, and W. A. Odendaal (Miners' Med. Bur., Council for Sci. and Ind. Res., Pneumoconiosis Res. Unit, Physiol. Div., Braamfontein, Johannesburg, South Africa). *Circulation*, vol. 32, Dec. 1965, p. 940-947. 17 refs.

The use of work speed, as opposed to work load, as a predictive variable for heart rate during steady state submaximal exercise, increased the correlation and decreased the standard error of the prediction around the regression line. The relationship of pulse rate and work speed was independent of body weight, while the relationship of pulse rate and work load was influenced by body weight. The establishment of a submaximal exercise test, which would be an equivalent physiological stress in subjects of different weights, would require that they perform exercise at a similar work speed rather than at a constant work load. Such recommendations are at variance with those previously made in regard to subjecting individuals of different weights to an equivalent exercise stress.

A66-81216

THE PRETERMINAL ARTERIOLES IN THE PULMONARY CIRCULATION OF HIGH-ALTITUDE NATIVES.

Sixto Recavarren (Peru U. de Ciencias Med. y Biol., Fac. de Med., Dept. of Pathol., Lima).

Circulation, vol. 33, Feb. 1966, p. 177-180. 13 refs.

Grant NIH H-7000-03.

The existence and function of pulmonary arterioles (capillary arterial collaterals of the pulmonary vascular tree) have been determined from the hemodynamics of the lungs in high-altitude subjects during exercise and from the features of acute high-altitude pulmonary edema. The arterioles appear to be involved in increasing peripheral arterial blood desaturation by providing by-passes between arterial and venous sides of the capillary bed. The opening of the arterioles serves as a compensatory safety valve to reduce pulmonary hypertension. The resulting increment in capillary hydrostatic pressure and the increased capillary permeability, secondary to hypoxia, are the fundamental factors in the production of edema.

A66-81217

PULMONARY PRESSURE, CARDIAC OUTPUT, AND ARTERIAL OXYGEN SATURATION DURING EXERCISE AT HIGH ALTITUDE AND AT SEA LEVEL.

Natalio Banchemo, Francisco Sime, Dante Peñaloza, Julio Cruz, Raúl Gamboa, and Emilio Marticorena (Peruvian U. "Cayetano Heredia", High Altitude Res. Inst., Cardiovascular Lab., Lima, Peru). *Circulation*, vol. 33, Feb. 1966, p. 249-262. 31 refs.

Grants PHS HE-06910 and G-8576.

Changes in pulmonary pressure, cardiac output, and arterial oxygen saturation due to physical exercise were measured in 35 lifetime residents of high altitude (14,900 feet above sea level) and in 22 residents at sea level. The exercise was moderate and was performed in supine position using a bicycle ergometer. The work load was 300 kg.-m./min./m.²; the average increase in oxygen uptake was 4.7 times at sea level and 4.8 times at high altitude. Both at sea level and at high altitude the cardiac output increased during exercise proportionally to the increase in oxygen uptake. The cardiac output, as well as the oxygen uptake, for the magnitude of exertion performed in this experiment, was almost the same at sea level and at high altitude. The cardiac output rose during exercise almost exclusively as a result of an increase in heart rate, while the stroke volume remained almost constant. Despite similar increase in cardiac output, the response of pulmonary pressure was smaller for sea-level subjects than for high-altitude subjects. During exercise, the arterial oxygen saturation did not change in the sea-level studies, but decreased significantly in the high-altitude studies.

A66-81218

A NEW VIEW OF PARATHYROID AND THYROID PHYSIOLOGY IN RELATION TO CALCIUM METABOLISM.

Leon Kratz (Brit. Columbia U., Fac. of Dentistry, Dept. of Oral Biol., Vancouver, Canada).

Journal of Oral Therapeutics and Pharmacology, vol. 2, Jan. 1966, p. 270-274. 21 refs.

The isolation, occurrence, and action of the hypocalcemic factors, calcitonin and thyrocalcitonin, from parathyroid and thyroid glands, respectively, are examined. While evidence has been rapidly accumulating that the thyroid gland is the source of the hypocalcemic hormone, contrary observations that the parathyroid glands elaborate the principle have been explained in part by hypothesizing the secretion of a humoral thyrocalcitonin-releasing factor from the parathyroids in response to hypercalcemia. Thyrocalcitonin activity has been demonstrated in the thyroid glands of rats, hogs, sheep, goats, monkeys, rabbits, and humans. Extract from the thyroid gland has been shown to be effective in rats, dogs, sheep, and goats.

A66-81219

ATHLETICS AT ALTITUDE.
Roger Bannister.

New Scientist, vol. 30, no. 493, Apr. 28, 1966, p. 228-229.

The effect of altitude in reducing the performance of athletes was studied by transporting six international three-milers to Mexico City (elevation 7500 feet) from a month of time-trials in England. The athletes were 8% slower over three miles after four days, but performance improved by 2% in a month. In the Olympic Games in Mexico City in 1968, differences in individual powers of altitude acclimatization could spell the difference between victory and defeat for athletes with the same "sea-level" potential.

A66-81220

RESISTIVE EXERCISES IN THE DEVELOPMENT OF MUSCULAR STRENGTH AND ENDURANCE.

Lynn W. McCraw and Stan Burnham (Tex. U., Austin).

Research Quarterly, vol. 37, Mar. 1966, p. 79-88. 36 refs.

Dept. of HEW supported research.

Three groups of college men participated for nine weeks in separate exercise programs to determine the relative effects of isotonic, isometric, and speed contractions on muscular strength and muscular endurance. Data examined by the multiple linear regression technique for variance analysis revealed little difference among programs for the group as a whole. Considerable differences, however, were apparent when the subjects' initial status on the attribute in question was considered.

A66-81221

METHODS FOR OBTAINING KINETIC DATA TO ANALYZE HUMAN MOTIONS.

Stanley C. Plagenhoef (Wesleyan U., Middletown, Conn.)

Research Quarterly, vol. 37, Mar. 1966, p. 103-112. 11 refs.

A kinematic and kinetic analysis of the human body in motion is presented. The horizontal and vertical forces may be obtained in any desired plane of any whole body action; however, most movements presented are limited to selected, symmetrical motions in the sagittal plane as seen from the side view. The aim of the study was the development of adequate methods of analysis through a combination of anatomical data-gathering, the obtaining of photographic records, and the proper application of mechanics. The steps necessary to obtain the magnitude of the joint forces and moments of force are presented, and general principles of motion are presented which are applicable to all whole body motions.

A66-81222

EFFECT OF ISOTONIC AND ISOMETRIC EXERCISES ON HEART RATE.

Esar Shvartz (Wash. State U., Pullman).

Research Quarterly, vol. 37, Mar. 1966, p. 121-125. 11 refs.

Twelve subjects were used to determine the effect of isotonic and isometric exercises on heart rate using a military press in a sitting position. The isotonic exercise was performed for 45 sec. with one-half of maximum resistance, and the isometric exercise was performed for 45 sec. with one-half, two-thirds, and maximum resistance. Isometric exercises performed for 45 sec., with one-half of maximum resistance, stimulated heart rate to the same extent as did isotonic exercise, using the same intensity and duration. Increasing the load in isometric contraction resulted in a proportional increase in heart rate, and increasing the load to maximum isometric contraction resulted in nearly twofold increase in heart rate.

A66-81223

INFLUENCE OF THREE DIFFERENT TRAINING PROGRAMS ON STRENGTH AND SPEED OF A LIMB MOVEMENT.

Jim D. Whitley (Calif. U., Riverside) and Leon E. Smith (Iowa U., Iowa City).

Research Quarterly, vol. 37, Mar. 1966, p. 132-142. 9 refs.

Grant PHS 12073-01.

A comparison was made of the effects of isometric-isotonic, dynamic-overload, and free-swing exercise programs on the speed and strength of a lateral arm movement. The 26 college men in each group, three experimental and one control, were given pre- and post-training speed and strength trials. Each experimental group performed its assigned exercise twice a week during the 10-week training period. Reliability coefficients for both strength and speed of movement measurements were high. Following training, there were significant speed increases in both the isometric-isotonic and dynamic-overload groups ($t=10.06$ and 8.10); however, the difference in speed gain between conditions was nonsignificant ($F=0.10$). Also, strength increases in both of these groups were significant ($t=8.81$ and 3.08), with that of the isometric-isotonic group significantly greater than the dynamic-overload group ($F=5.11$). No significant speed or strength gain was registered by the free swing or control groups.

A66-81224

THE INFLUENCE OF TWILIGHT DURATION ON LOCOMOTOR ACTIVITY OF RABBITS.

W. J. Rietveld and W. E. M. Tordoir (Leyden U., Dept. of Physiol., Psychophysiol. Div., The Netherlands).

Acta physiologica et pharmacologica neerlandica, vol. 13, no. 4, Feb. 1966, p. 467-475. 10 refs.

The influence of duration of artificial twilight on the activity pattern of young, young-adult, and relatively old rabbits was investigated. It was found that, in young-adult rabbits, the twilight activity peaks are higher, as is overall activity, when the transitions between light and dark are abrupt, than at artificial twilight durations of 15, 30, 60, and 120 min. Over this range of twilight durations the duration of twilight has no systematic influence on activity, independent of L/D ratio. In young rabbits, activity at a twilight duration of 15 min. is higher than for a duration of 30 min. In old rabbits the difference between the pattern at zero twilight duration and the others tends to disappear.

A66-81225

DIFFERENTIAL EFFECTS OF A STRESS ON LIVER ENZYMES IN ADULT AND INFANT RATS.

S. Schapiro, E. Geller, and A. Yowler (Calif. U., Center for the Health Sci., Los Angeles).

Neuroendocrinology, vol. 1, no. 3, 1965/66, p. 138-143. 11 refs.

Grants PHS AM-06603 and AM-08775.

Infant rats, four and eight days after birth, respond to the stress of 30 min. on a noisy rectiprocating shaker with a large increase in liver aromatic amino acid transaminase activities. Adult rats exposed to the same stress do not exhibit this change. In the adult rat the inducing effects of cortisol on transaminase activities are blocked by this stress. These results suggest the activation of a mechanism (α) in the adult rat which opposes the enzyme-inducing effects of cortisol. This mechanism is non-functional during early post-natal life. The half-life of cortisol is considerably longer in the infant rat than in the adult.

A66-81226

STERILIZATION WITH ETHYLENE OXIDE.

M. Pastni and I. Janjic (School of Med., Surg. Dept., Zagreb, Yugoslavia).

Liječnički Vjesnik, vol. 87, no. 1, 1965, p. 57-59.

Medical Journal, vol. 87, no. 1, 1965, p. 40-42. 5 refs. Translation.

Because of the growing use of thermolabile plastic materials and of instruments sensitive to heat, cold sterilization with ethylene oxide is being increasingly used. This method allows sterilization of sensitive equipment which up to now could only be sterilized with formalin vapor. Because of the excellent penetration of ethylene oxide, all equipment can be sterilized without being taken apart. At a temperature of 55°C. and a pressure of 5.5 atmospheres complete destruction of all spores, viruses, and vegetative germs is achieved after 65 minutes.

A66-81227

INCORPORATION OF C-14 LYSINE INTO SPINAL ROOTS, SPINAL GANGLIA AND PERIPHERAL NERVES OF THE RAT.

Gustavo S. L. Appelbauer and Eduardo E. A. Saá (Inst. de Invest. de Ciencias Biol., Lab. of Biophys., Montevideo, Uruguay).

(First Intern. Congr. of Nucl. Biol. and Med., Sao Paulo, Sep. 1964).

Experimental Neurology, vol. 14, Apr. 1966, p. 484-495. 29 refs.

Grants AFOSR 313-64, Rockefeller Found. RF 58122 and 61034.

The incorporation of intrathecally and intraperitoneally administered C-14 L-lysine into the cerebrospinal fluid, spinal roots, spinal ganglia, peripheral nerves, serum, liver, and lymph nodes of adult rats was studied in periods of time ranging from 30 min. to 30 hours. The tissues were separated with organic solvents into three fractions which contained the free amino-acids, proteins, and proteolipids. The C-14 lysine moved freely from the cerebrospinal fluid into the spinal roots and spinal ganglia and was readily incorporated into proteins. After the intrathecal injection, it was rapidly removed from the subarachnoid space by exchange with the blood and lymph. The half-life of free lysine was calculated: 79 min. in the cerebrospinal fluid, 71 min. in the spinal ganglia and 137 min. in the spinal roots. After intraperitoneal injection, the specific activity of the peripheral nerves was very low, the C-14 lysine being concentrated mainly in the distal part. After intrathecal injection, the activity was much higher and was concentrated in the proximal part of peripheral nerves. Evidence of very rapid transport of free and protein-bound C-14 lysine in the endoneurial spaces is presented.

A66-81228

RESULTS OF PHYSIOLOGICAL AND BIOCHEMICAL EXAMINATIONS OF THE "VOSKHOD" SPACE CREW [REZULTATY FIZIOLOGO-BIOKHIMICHESKOGO OBSLEDOVANIYA CHLENOV EKIPAZHA KOSMICHESKOGO KORABLIA "VOSKHOD"].

I. S. Balakhovskii, P. V. Vasil'ev, I. I. Kas'ian, and I. G. Popov.
Izvestiia Akademii Nauk SSSR. Seriya Biologicheskaya, Mar.-Apr. 1966,
 p. 212-220. 14 refs. In Russian.

The data are presented on response of the "Voskhod" cosmonauts, V. M. Komarov, K. P. Feoktistov, and B. B. Egorov, observed during their day-long orbital flight. The pilots exhibited some functional changes in the cardiovascular and respiratory systems as well as in their metabolism which give evidence of the stress and fatigue developed in the course of the flight. Normalization occurred after landing. The character and degree of functional state changes of the space pilots were mainly adaptive. Individual peculiarities of pilots' reactions in response to space flight factors were in agreement with predictions made according to observation during the course of their selection and ground training.

A66-81229

COMPARATIVE CHARACTERISTICS OF VEGETATIVE REACTIONS IN RESPONSE TO SOME CUMULATIVE METHODS TO STIMULATE THE VESTIBULAR ANALYZER (SRAVNITEL'NAIA KHARAKTERISTIKA VEGETATIVNYKH REAKTSII PRI NEKOTORYKH KUMULATIVNYKH METODAKH RAZDRAZHENIIA VESTIBILIARNOGO ANALIZATORA).
 S. S. Markarian and R. A. Vartbaronov.
Izvestiia Akademii Nauk SSSR. Seriya Biologicheskaya, Mar.-Apr. 1966,
 p. 221-229. 24 refs. In Russian.

The effect of angular, linear, and Coriolis accelerations on vestibular apparatus and the general functional state of subjects was studied. The functions of the vestibular analyzer were assessed with the aid of electrocardiographic, ballistocardiographic, pneumographic, capillaroscopic, and electrothermometric techniques and oxyhemometric method of estimating the blood flow rate. The changes found in the physiological reactions were correlated with the degree of motion sickness caused by various combinations of stimulation. Changes in the complexion of the test subjects, their pulse rate increase, decrease of the blood flow rate, and reduction of the heat circulation index were the best indicators of motion sickness. A comparison of diverse methods of cumulative stimulation of the vestibular apparatus, based on medical observations and data of physiological reactions, suggests that the method of cumulation of Coriolis accelerations ought to be employed for appraisal of vestibular stability in subjects.

A66-81230

FRACTIONAL SLEEP IN THE MONOMODAL CANAL OF THE INFORMATION TRANSMISSION AND THE ROLE OF THE FEED-BACK IN THE CONTROL OF AFFERENT PULSES OF THE SYSTEM INPUT (PARTSIAL'NYI SON V MONOMODAL'NOM KANALE PEREDACHI INFORMATSII I ROl' OBRATNOI SVIAZI V REGULIROVANII AFFERENTNOI IMPUL'SATSII NA VKHODE SISTEMY).
 M. M. Ataev.
Izvestiia Akademii Nauk SSSR. Seriya Biologicheskaya, Mar.-Apr. 1966,
 p. 230-243. 53 refs. In Russian.

A series of experiments was carried out to study changes in the evoked potentials of the retina, exterior geniculate body, reticular formation of the mid-brain, and optic cortex of intact cats and of those with extirpated cerebral cortex, as well as of animals with cut optic nerve. The experiments were conducted under the conditions of a prolonged rhythmic light stimulation. In all the recordings, the amplitude of the evoked potentials was inhibited until it disappeared almost completely while the latent period increased. The cortical recording was the only one in which delayed potentials developed and disappeared later. An external stimulus of a different sensory modality brought about a complete or partial restoration of the pattern of the response of the retina, exterior geniculate body, reticular formation of the mid-brain, and optic cortex. The potentials of the retina were not depressed after a complete cutting of the optic nerve. A bilateral extirpation of the optic cortex produced no noticeable effect on the amplitude of the retina. The effect of the optic nerve cutting and the optic cortex extirpation upon the electric response of the retina indicates a cortical nature of the centrifugal inhibitory effect via the feed-back, as well as an active character of the inhibition process.

Subject Index

AEROSPACE MEDICINE AND BIOLOGY / *a continuing bibliography*

JULY 1966

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A

ABIOTENESIS

HYDROCARBONS SYNTHESIZED ABIOTENICALLY AND THOSE FOUND IN TERRESTRIAL SAMPLES, USING GAS CHROMATOGRAPHY AND MASS SPECTROMETRY IN CONNECTION WITH TERRESTRIAL LIFE A66-24965

ABSORPTION SPECTRUM

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